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H. C. PARMELEE, Editor

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Cold Facts About Coal

WHAT would you think of a manufacturer who kept on hand a stock of raw material sufficient to provide for his trade 200 years hence? If he were the seller and you the buyer, would you permit him to add the taxes and interest on these tremendous reserves to the price you pay for your current purchases? Yet that is exactly the situation that obtains today in at least a considerable part of the anthracite coal industry in this country.

When the United States Coal Commission laid before the President its recent report on "Investments and Profits in Anthracite Mining" it had this to say of the situation:

"The amount of the increment in value of coal lands is a matter deserving careful consideration, not only with respect to anthracite but also with respect to bituminous coal. If this increase in market value is to continue indefinitely piling up carrying charges to be added to current prices, an intolerable burden will be laid on the consumer. Taxes and interest on coal not to be mined within 40 years are not properly chargeable to present operations. Speculation in land should not be confused with mining coal!"

The investigation further showed that one of the large railroad coal companies was actually overburdened with reserves sufficient to last for more than 200 years. Stated in other words, this corporation has embarked on a 200-year land gamble and has so arranged it that the public will pay the bill out of the present price of coal. If the work of the commission succeeds in doing nothing more than abolishing such a practice, it will have done an immeasurable service to the coal consumer.

But this is not all the commission has to say about this situation. Its report has three other specific recommendations for the attention of government and industry. In the first place, if the public is going to be able "to share in the good fortune" of the low-cost producer and at the same time pay a price that will not bankrupt the high-cost operator, whose output is sorely needed, then some radical change in taxation methods must be made. The commission's solution for the problem is a differential system in which the taxes are made more directly proportional to profits than under the present basis. Complete publicity of producing operations and sales constitutes one means of protection against unjustified increase in prices, according to the second of the commission's suggestions. Control by a federal agency empowered to compel reports and prescribe the form of accounts appears to be the logical mechanism for carrying this proposal into effect. The final recommendation is tersely phrased in a single sentence: "We commend to consumers the use of substitute fuels." This is not, in itself, a new suggestion, but it is a weapon in the hands of the consumer that can be made one of the most effective protests against unreasonable and indefensible profits.

Research and Industrial Education In the Meat-Packing Industry

THOSE who have participated in the development of research and educational activities by trade associations will agree that where the results have been of permanent value the evolution has usually been a matter of unlimited time and patience, even in those industries where the importance of technology is fully recognized. Where science and technology have not yet penetrated an industry deeply, progress is likely to be even slower. Consequently we may be pardoned if we felt that the plans of the Institute of American Meat Packers for education and research proposed early in 1922 were likely to mature some time in the distant, rather than the immediate, future. Nevertheless today, less than 2 years since Thomas E. Wilson first proposed the plan, departments of practical research and industrial education have been organized and are already functioning under competent directors. Truly a remarkable achievement, that shows what can be accomplished when vision is coupled with the ability to sell an idea in terms of everyday business.

It is interesting to note briefly the steps that have marked this development and thus to trace the evolution from conception to realization. On Feb. 24, 1922, Thomas E. Wilson proposed an extensive development plan to the Institute of American Meat Packers, of which Mr. Wilson was then president. In this plan it was recommended that the association "ultimately should become an organization which shall be a combined trade association, industrial museum, research institute and educational institution." In April, 1922, the executive committee directed that the plan, now known as the Institute Plan, be transmitted to the entire membership and that the commission and committees provided by the plan be appointed and called into action.

On June 1, 1922, the Institute Plan Commission and its committees held a well-attended meeting and began work. At a general session of the Institute in convention, Oct. 10, 1922, the Institute Plan Commission, after having heard previously the recommendations of its several committees, proposed to the convention a report recommending that the Institute Plan be adopted and that certain stated action be taken to forward it. The recommendations of the commission were adopted by unanimous vote.

These recommendations included a provision that the Institute raise by volunteer subscription the sum of

$50,000 a year for 3 years to be spent on educational and research activities with the guidance of the Institute Plan Commission.

In the spring of 1923 the School of Commerce and Administration of the University of Chicago and the Institute Plan Commission co-operated in arranging and offering a series of eight lectures on the packing industry which, while very general in nature and not given for strictly pedagogical purposes, brought together sufficient material, never before correlated, to attract an average attendance of five hundred persons, most of them from the packing industry, and to warrant later publication of the lectures in book form.

While these lectures were in progress the Institute of American Meat Packers appointed a director of its Bureau of Industrial Education, who has since been co-operating with its officers and committees and later with the University of Chicago, especially in the development of concrete plans for the work to be undertaken during the coming academic year.

On July 9, 1923, the secretary of the Institute Plan Commission, after consultation with other appropriate officials of the Institute, proposed, subject to ratification at the convention of the Institute, that the university and the Institute of American Meat Packers, under a form of co-operation that would safeguard beyond question the university's scholarly traditions, offer instruction and carry on research.

On Aug. 9, 1923, the president of the university presented the Institute's proposal, with a favorable recommendation, to the board of trustees, and that body approved recommendations and gave authority for undertaking the work proposed. On Sept. 18 the Institute, in convention at Atlantic City, ratified the negotiations with the university and authorized the undertaking. At the present time evening courses are being given covering meat-packing operations, superintendence, service of science, economics, accounting and finance. It is planned to supplement these with full-time day courses in October, 1924, and to begin research at an early date.

We take this opportunity to congratulate the meat-packing industry on its prompt adoption of such a far-sighted policy and to bespeak for its ventures an ever-increasing measure of success.

Peace-Time Industries From War Developments

FEW new peace-time industries arose as a direct consequence of the war, although many lessons were learned as to the practicability of new manufacturing processes if ample capital were available. In fact, the prodigality with which government money had to be spent hindered development along commercial lines in many instances, because of the ever-present reminder of the amount of capital apparently needed to launch the enterprise. A few ambitious individuals, however, have shown that peace-time economies can be grafted onto war-time developments and new industries developed. An example of one of these is the fruit-pit charcoal industry of California.

It will be recalled that the intensive use of poison gas in the later years of the war demanded the perfection of protective measures; and considerable research was performed on sundry types of adsorbents for use in gas masks. Of these, charcoal proved the most practicable. Of the available raw material, fruit-pit charcoal gave good results; and a campaign was started to prevent the wastage of as much of the so-called refuse as possible. Readers will recall the barrels placed in public places, where fruit pits could be collected for war purposes. Closely associated with this work in California, where on account of the enormous quantity of fruit canned there is a corresponding amount of pits available, was Stanley Hiller, who has developed a process and the necessary equipment to make the peace-time utilization of this waste material a profitable venture. At the termination of the war the government was left with 8,000 tons of fruit pits in San Francisco, in a plant that had involved the expenditure of immense amounts of money and a process of charcoal manufacture the cost of which was justified only in a time of national emergency.

Mr. Hiller took over what appeared to most persons as a white elephant and has since developed an economical and rapid process for the production of fruit-pit charcoal, using the immense amount of raw material available from the California canneries. The plant is now in successful operation at San Jose. It serves as one of the few peace-time memorials to war-time initiative in the chemical engineering industries.

Coking Versus Complete Gasification of Coal

THERE are at the present time two distinct trends in the processing of coal, one toward complete gasification, and the other toward the development of coke-making systems. In the one case, the effort is clearly to follow the advice given by the president of the American Gas Association a year ago, when he said:

"Some of you gentlemen are going to be able to give a gas from raw coal of 420 B.t.u. and we are going to have no byproducts to handle or sell, nothing but ashes to take away from the coal. When you give that to us (and you are going to give it to us within the next 5 years), then the problem of the owner of gas property will be much simpler than it is today, when he must make coal gas with an enormous quantity of coke left as residue, which puts him into a business of a larger dollars-and-cents annual turnover than his gas business."

This quotation is used as a text for the latest "complete gasification" committee report of the A.G.A. But the question can justifiably be raised by chemical engineers whether this tendency to complete gasification, with no byproducts except ashes, is a sound and justifiable one. The arguments for carbonization of coal with coke as an important byproduct are so good as to forbid their neglect.

The public utility management official who objects to coke ovens or vertical retorts for coal carbonization generally does so because of the restrictive system of public utility rate-fixing. This system demands that all of the income in coke, tar, ammonia and other byproducts be applied as a credit to the gas-making expense. The net cost of the gas is then divided by the quantity made, in order to determine the proper unit income for the company and eventually the proper rate to be charged the public for gas. As a consequence the commodity, which represents with the coke oven only 10 or 15 per cent of the gross income, must dominate all of the prices. And the operator must make all of his profit for dividends on the gas, as all of the gross income from the other products is merely an

operating credit. This is obviously a faulty system of account keeping, considered from a general economic point of view.

Those who recognize the difficulties of public utility ownership and operation of a coke oven must not exaggerate these difficulties to the extent of saying that they preclude such installations. The fault is with the system of cost keeping and utility regulation, not with the method of coal processing. Both coke ovens and complete gasification systems will go forward in parallel, each serving those companies for which they are peculiarly adapted.

The real solution of the problem where coke ovens or vertical retorts with their several products afford the best promise of technical and business success lies in making the gas-manufacturing department an independent corporation, selling gas to the public utility company. There has been during the past 10 or 15 years a distinct tendency toward this, through supply of gas to city companies by coke-oven operators. This tendency should be encouraged.

A Health Investment For Our Industries

ACCORDING to the last census, there are approximately thirty-five million industrial workers in the United States. It is estimated by the U. S. Public Health Service that an average of from 7 to 9 days' wages per year is lost by each of these workers because of sickness. Taking $3 a day as an average wage, we find the total annual loss to be somewhere in the neighborhood of $735,000,000. If this represents a conservative estimate of the financial liability of ill health to the worker, how much greater would be an accurate compilation of the loss in actual production to the employer! It might well run into billions.

Let us assume that anyone is more or less likely to be ill at some time during the year and that consequently there must be an irreducible minimum of illness. For the benefit of the skeptic, there is proof that the minimum is considerably less than at first seems possible. A certain large manufacturing concern in the Middle West installed an expert medical service for its employees a number of years ago. This included periodical medical examinations, nursing care, rest rooms, and even rubbers and umbrellas for rainy days. Recent figures brought out the fact that in this plant the yearly loss in time per person has been reduced to an average of 13 hours. The medical director of a large Eastern public service plant declares that during the 10 years of his service the amount of tuberculosis among the concern's employees has actually been reduced to one-third of what it was 10 years ago. Another concern employing thousands of men and women goes so far as to maintain a tuberculosis sanatorium for its employees who are stricken with the disease. Perhaps the most famous example of the business soundness of a health investment is Port Sunlight, the industrial community established in England by Lever Brothers. The originator of Port Sunlight, which is an ideally managed industrial community from the health standpoint, is Lord Leverhulme, whose business has spread over two continents and whose fortune ranks among the largest in the world.

But not only the million dollar corporation finds that it pays to keep its working staff physically fit. The smaller employer also benefits. In New York there is an organization that employs fewer than twenty-five young women. These, as well as every executive on the staff, are obliged to have a complete physical examination once a year. In that office there has been practically no change in the personnel during the past 4 years.

Every plant has a shop where broken and imperfect parts of machinery are sent for repairs and overhauling. Just as logically there should be a repair shop for the broken and imperfect human machines that form the backbone of a business. At the head of the human repair shop should be a trained physician, one thoroughly acquainted with industrial diseases and aware that it is as much a job to make money for the firm as if he were a foreman or a sales manager. Dr. Donald B. Armstrong, executive officer of the National Health Council, has given the following definition of what constitutes an ideal industrial medical service:

"Diminish employment of the unfit; assign men to suitable jobs; run a regular clinic service and treat accidents; study and eliminate unhygienic conditions throughout the plant as to ventilation, light, cleanliness and accident hazards; diagnose chronic affections and refer them to the patient's own physician for treatment; promote health education by posters and talks; provide a special personnel service for the executives, a sort of life extension in industry; examine new employees and old employees periodically."

Another great organization engaged in an active campaign of disease prevention is the National Tuberculosis Association, with its 1,200 affiliated associations. This health machinery, functioning through periodical physical examinations, education in regard to the care of the body and adequate treatment of tubercular patients, is an asset of incalculable value to industry. The health hazard in chemical engineering production is doubtless greater than in other less strenuous lines of manufacture. Proportionately greater, therefore, is our obligation to contribute to the financial support that allows this association to continue its service to industry. The sixteenth annual sale of Christmas seals, which begins in December, offers us this opportunity.

Good Advice For Authors

DR. H. FOSTER BAIN, director of the Bureau of Mines, in a memorandum to his technical staff, writes as follows:

"Some tendency has begun to appear for the authors to attempt to crowd too much into a report. It should be remembered that the editors of the various journals work under limitations as to space and time and cannot use long articles. Neither do they always have time to digest and summarize something which the author has not felt sufficiently interested in to boil down to simple essential statements. In the end a much larger audience will be reached more promptly if time be put on thinking out the few right words than on writing many that are about right. Study condensation. Analyze your material. Select your best illustrations, rather than list all you know. A report that runs to more than ten double-spaced typewritten pages will be put aside by many editors to condense later—and next week something else takes his time."

The advice to bureau men is good. We commend the same ideas to other technical writers.

The Engineer of the Future

What Manner of Man Should He Be? How Should He Be Trained?

W. E. Wickenden

Director of Inquiry Into Engineering Education

ON Oct. 31 the trustees of the Carnegie Corporation of New York adopted a resolution that will be far reaching in its beneficial effects. They set aside a total of $108,000 for the purpose of making possible a study of engineering education under the direction of the Society for the Promotion of Engineering Education. The sum of $24,000 will be available during the current fiscal year and $12,000 during the fiscal year of 1924, with the understanding that if substantial progress has been made by Jan. 1, 1925, $24,000 more will be available in the fiscal year 1924 and $48,000 in the fiscal year 1925.

In order to appreciate more fully the constructive, far-sighted nature of this program it will be desirable for us to dip into the conception and history of the effort. It began in 1922, when the Society for the Promotion of Engineering Education appointed a development committee to study the development of the society and to formulate an answer to the question, "What can the society do in a comprehensive way to develop, broaden and enrich engineering education?" President C. F. Scott, professor of electrical engineering at Yale, appointed the following men, who with himself made up the committee: Dean M. E. Cooley, Michigan; John H. Dunlap, secretary of the A.S.C.E.; Prof. D. C. Jackson, Massachusetts Institute of Technology, and President F. W. McNair, of the Michigan College of Mines.

A Committee of Action

The committee was evidently a committee of action, for within a short time the members had constituted themselves a board of investigation with three purposes. They desired to promote actively engineering education in the light of future needs, to co-ordinate the activities of interested agencies and to conduct research in engineering education. The co-operation of engineering schools was sought and President Scott and Dr. Jackson conferred with Dr. Pritchett of the Carnegie Corporation as to the possibility of supplementing and continuing the work of Dr. C. R. Mann.

After numerous conferences with Dr. Pritchett a letter embodying the aims and purposes of the proposed investigation was drawn up: ". . . to study the process by which the curriculum of 50 years ago has come to its present form; to set forth the nature and weakness of the present curriculum and indicate such modifications as seem desirable."

To carry out this purpose an organization and program were suggested and these suggestions are significant, as they are again indicative of the vision and enlightenment that have characterized this work. First, the committee of the Society for the Promotion of Engineering Education should have general charge of the inquiry but the committee should include at least two men chosen outside of the society and the engineering profession who are primarily trained teachers. A director with offices in the engineering building should be appointed to take active charge of the work. Committees of the faculties of engineering schools of this country should be organized (and activated) for co-operation, and a survey of European schools should be made.

Director Appointed

Dr. Pritchett formally indorsed the plan, urging the greatest care in the selection of a director who would be the key man in the inquiry and promising his recommendation of the plan to the Carnegie Foundation.

And so we have as the result, an investigation inaugurated and financed! But perhaps more significant as indicating the ultimate success of the project, William E. Wickenden has been appointed director. A graduate of Denison University in 1904 and with some teaching and graduate student experience, he was for 10 years assistant and associate professor of electrical engineering at Massachusetts Institute of Technology. He made an exhaustive study of personnel problems for the Western Electric Co. which resulted in the creation (1918) of a personnel department, of which he became director. In 1921 he was transferred to the headquarters staff of the American Telephone & Telegraph Co. as assistant vice-president. He has had charge of the tremendous work of recruiting and training the technical personnel of the Bell system. Extensive liaison work with engineering schools and the introduction of about 2,500 engineers to and into the telephone business are parts of the task.

The promise is bright for a notable achievement in this inquiry. It is fitting to express the widely felt gratitude of the engineering fraternity to President Scott and his associates and to reflect the spirit of enthusiasm and co-operation that awaits Mr. Wickenden in his work.

An Unusual Process for

Concentrating Nitric Acid

Operated at One of the Large Norwegian Plants Where Nitric Acid Is Produced in Dilute Solution by the Arc Process

BY N. TITLESTAD, DR. ING.
Consulting Chemical Engineer, Christiania, Norway

THE successful operation of the concentration process for nitric acid, used by the Norwegian nitrate factories, should make it a subject of considerable interest to your readers.

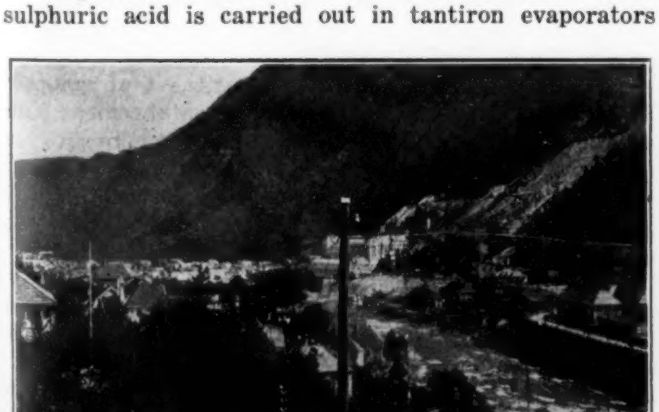
The weak nitric acid is obtained by the arc process, according to patents of Birkeland-Eyde and of Schönherr. This process has often been described, and it is unnecessary to discuss it here. The Norwegian company Norsk Hydroelektrisk Kvælstofaktieselskab uses about 330,000 hp. in three factories, one of which is situated at Notodden, using about 50,000 to 70,000 hp., and two situated at Rjukan, each using about 140,000 hp. The total production of weak nitric acid amounts to about 100,000 tons HNO_3 of 25 per cent strength per annum. The main quantity of this acid is made in calcium nitrate, Norgessaltpeter. In addition to this production, nitrite and nitrate of soda are procured as byproducts. The plants, which from every point of view are up to date, work with the highest degree of economy; they have been in steady operation from the start without interruption other than that caused by lack of water by the power plants. Cost of upkeep and repairs is unusually small, and does not exceed 2 per cent of cost of plant.

The nitric acid concentrating plant is built in connection with the second factory at Rjukan. Its capacity is about 10,000 tons of nitric acid of 49 deg. Bé. per annum, which corresponds to about 25 per cent of the total quantity of acid produced in this factory.

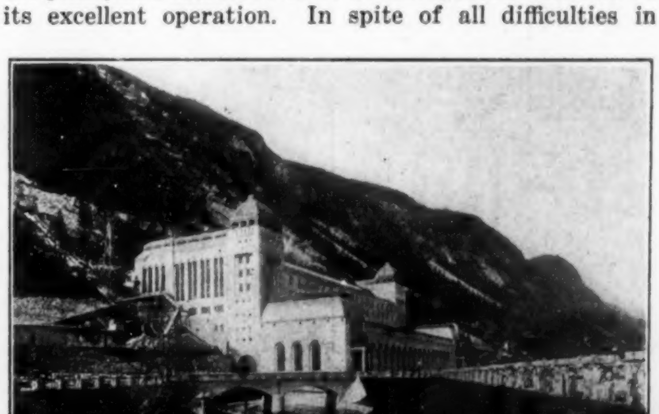
The concentration process is divided into three different operations: The preconcentration of weak nitric acid from 25 per cent to 55 to 60 per cent; the final concentration, by means of sulphuric acid and steam, and the reconcentration of sulphuric acid.

The preconcentration as well as the reconcentration of sulphuric acid is carried out in tantiron evaporators with steam of 90 to 150 lb. pressure. It may seem curious that this unusual and new method for concentration of acids, especially that of sulphuric acid, was chosen, instead of using concentrating towers and hot gases, which could easily be obtained from the furnaces. The latter process has the great disadvantage of producing a disagreeable and irritating atmosphere due to the small particles of sulphuric acid contained in the waste gases, which are difficult to remove. Therefore, since it was proposed to produce large quantities of acid, it was thought these gases would be very disagreeable to the population in the narrow valley, where the factories were situated. Other reasons also made it necessary to place furnace and boiler house about three-quarters of a mile away from the other part of the plant, and it would therefore be not only difficult but very expensive to obtain the hot gases with the necessary high and constant temperature needed by the concentration process. It was also of considerable advantage that this new process be quite independent of the other part of the plant, and therefore exert no unexpected influence on its excellent operation. In spite of all difficulties in

NITRATE FACTORIES AT NOTODDEN



TOWN OF RJUKAN



POWER STATION AND FURNACE HOUSE AT RJUKAN

TOWN OF NOTODDEN WITH FACTORIES

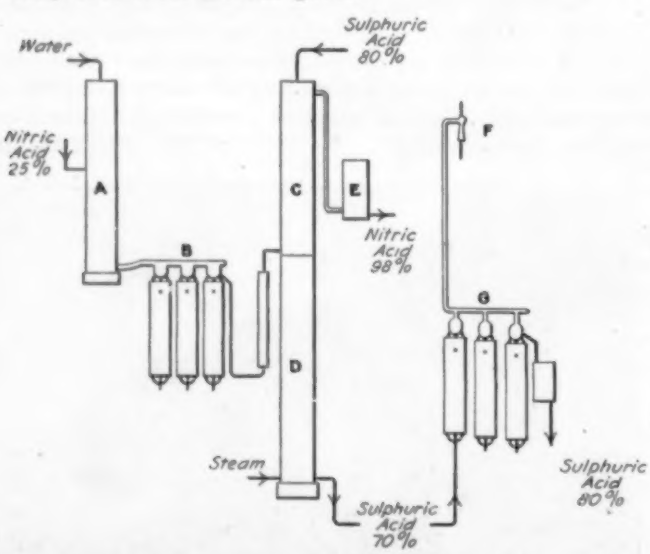
NITRATE FACTORIES AT RJUKAN

getting suitable acid-resisting apparatus, however, the experiments led to very satisfactory results.

The combined process may be understood from the diagram herewith.

Preconcentration of Weak Nitric Acid—The weak nitric acid, 25 to 30 per cent of strength, is added to the middle of the dephlegmating column *A*, passing through this into the tantiron evaporators, *B*. The evaporator consists of three or four units, similar in design to those used for the concentration of other liquids. In the construction, however, there is a considerable difference, because of the special physical properties of tantiron. The steam from the evaporators passes counter-current to the weak nitric acid back through the dephlegmating column, on the top of which a small amount of water is added, in order to catch the last traces of acid. The vapors escape practically free from acid, and are condensed.

Final Concentration—The nitric acid obtained by the preconcentration is conducted to the so-called denitrating column on top of which is constructed the so-called drying column, *C*. This is sprinkled with sulphuric acid of about 80 per cent. At the bottom of the denitrating column dry steam is supplied. The vapors of nitric acid, which escape at the top of the column, are passed counter-current to the condensed acid from the condenser, *E*. After cooling, an acid of 98 to 99 per cent is obtained. The product is almost water white and practically free from nitrous gases.



PROCESS DIAGRAM OF NITRIC ACID CONCENTRATION PLANT

Reconcentration of Sulphuric Acid—The sulphuric acid, of about 55 to 70 per cent, leaving the denitrating column at the bottom, is first run to a vacuum denitrator of tantiron, and then to the vacuum evaporator, *G*. A steam pressure of 120 to 150 lb. is used, and a high vacuum of 3 to 4 in. mercury pressure kept. The construction of the sulphuric acid evaporator is not very different from that used for nitric acid.

The plant runs automatically and with better yield and production than expected. The loss of nitric acid is small, and that of sulphuric acid a minimum, 0.2 to 0.5 per cent. For running a plant of 10,000 tons yearly capacity only a few men on shift are necessary.

Cost Data—It has often been stated that the arc process for making nitrogen products is outdistanced by other processes and can therefore hardly compete. However, the construction cost of the plant, which is a very large item, can be reduced considerably, and where there is cheap electric power, as for instance in Norway and on the west coast of America, the process has much in its favor and may prove economical.

Oxy-Chloride Cements Investigated

Comparatively few users of oxy-chloride cement are really familiar with it. Even among architects and builders oxy-chloride cement products are often known only in connection with trade names. The rapidly increasing demand for these materials shows that they possess certain desirable peculiarities, and has made it necessary to replace haphazard or rule-of-thumb methods in the manufacture and use of this cement with more scientific methods based on the study of numerous tests. In this connection the Bureau of Standards has recently published the results of its work on this material in Technologic Paper 239.

Caustic magnesia, the chief constituent of oxy-chloride cement, was made in the experimental cement plant of the Bureau of Standards by calcining magnesite ore. The temperature and other conditions were varied in order to study the effects on the properties of the product. An ore imported from Greece, one shipped from the State of Washington and two from different mines in California were used, as these were representative of the chief sources of supply for this country. Cement mixtures, typical of those used by the trade, were then made, and were given laboratory and service tests.

The results of this work form an important contribution to the information necessary for the production of the most satisfactory oxy-chloride cement products.

New Operating Methods in Calcining and Grinding

Los Angeles Company Uses Buhr Mills for Grinding Gypsum, New Calciners and Tube Mills for Finished Plaster

By A. W. Allen,
Assistant Editor, *Chem. & Met.*

THE extraordinary growth of the Los Angeles district of California, evidenced by the fact that the city now holds third place in the United States in total cost represented by building permits issued, which aggregated more than $15,000,000 in July, 1923, has necessitated prompt expansion locally in the facilities for the production of building materials. One of the most important of these is gypsum plaster, a new mill for the production of which has recently been built and put in operation by the Blue Diamond Materials Co. It was designed by John Schreiner, the company's production manager.

The raw material, gypsum, of exceptional purity, is quarried at the deposit, 28 miles from Maria, which is 17 miles from El Centro, on the San Diego & Eastern R. R. The rock is drilled by means of a well drill and blasted in the usual manner. It is loaded with a P. & H. (Pawling & Harnischfeger) tractor-mounted gasoline shovel with a $\frac{3}{4}$-cu.yd. dipper into cars, coarse crushed at Maria and transported in side-dump railroad cars to the Blue Diamond plant at 2,200 East 16th St., at Alameda St., Los Angeles, which has a capacity of 250 tons per 24 hours.

From a receiving hopper the gypsum passes by chute and belt conveyor to the boot of a belt and bucket elevator, from which it is delivered to a system of cross

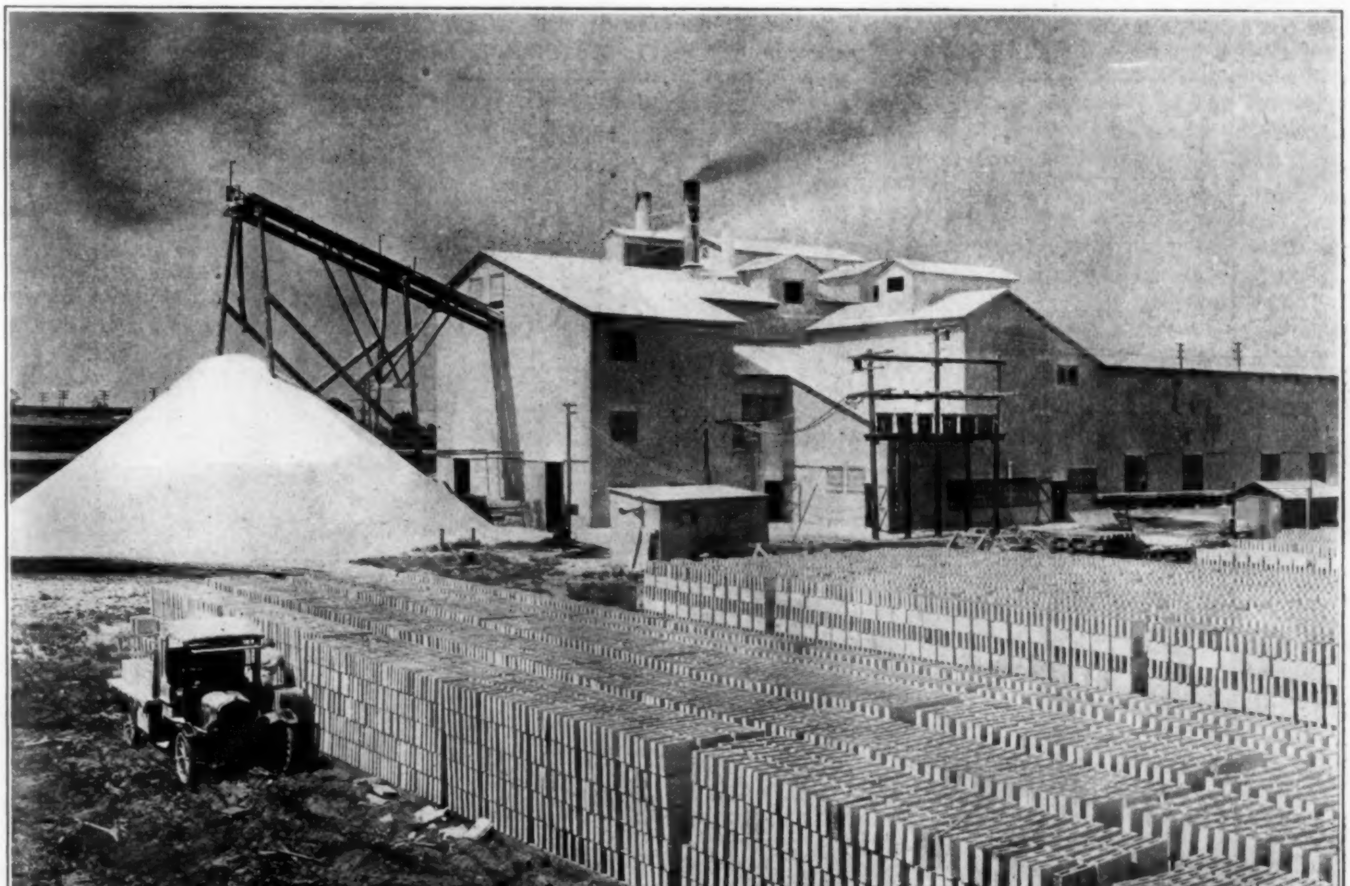
GASOLINE SHOVEL LOADING CARS WITH GYPSUM

conveyors that feed three 140 ton bins. From these it is delivered to a battery of eight vertical buhr[1] mills, supplied by the J. B. Ehrsam & Sons Mfg. Co., of Enterprise, Kan. In these it is reduced so that a high percentage passes 100 mesh, by the grinding action of stone disks, one of which in each mill is stationary and the other revolves at about 600 r.p.m. The faces of the disks are cut with radial grooves, it being necessary to "sharpen" the depressions every few weeks. This is done by means of a small pneumatically operated chipping hammer.

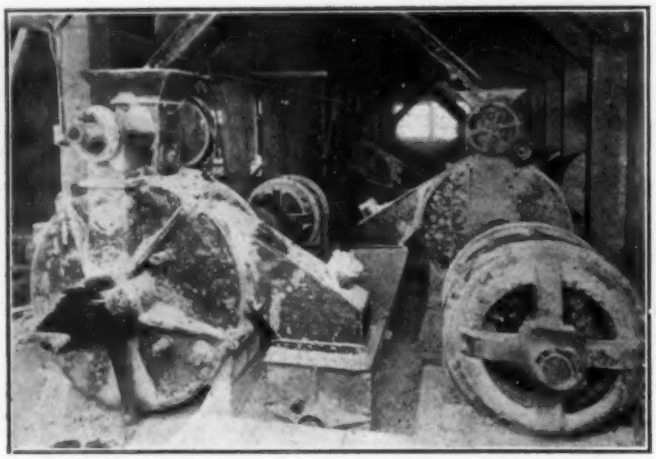
The discharge from the buhr mills is elevated and conveyed by screw conveyor, in two sections, to a 140-ton bin, from which it passes by gravity to two oil-burning kettles, also built by the Ehrsam company. In these the gypsum is converted into plaster, batch operation being practiced.

The bottoms of the kettles are made of cast iron,

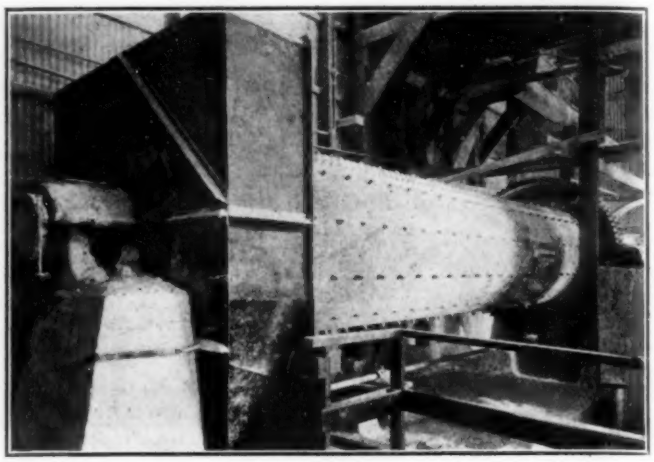
[1]From buhrstone, a siliceous rock used for grinding purposes.



THE BLUE DIAMOND MATERIALS CO.'S GYPSUM PLASTER PLANT AT LOS ANGELES



EHRSAM VERTICAL BUHR MILLS GRINDING GYPSUM AT THE BLUE DIAMOND PLANT



TUBE MILL USED FOR GRINDING THE CALCINED GYPSUM

underneath which there is a masonry fire box, built up in such a manner that an air space is left between the walls and the side of the kettle. The hot air and gases pass around the kettle, across flues extending from side to side, and thence to the stack. The gypsum is kept in motion by means of paddles, the operation taking about 3 hours.

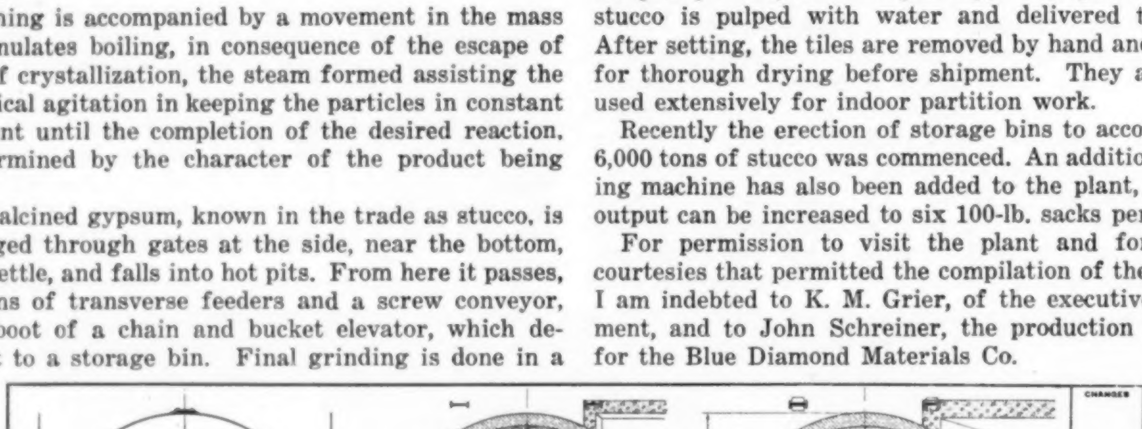
Calcining is accompanied by a movement in the mass that simulates boiling, in consequence of the escape of water of crystallization, the steam formed assisting the mechanical agitation in keeping the particles in constant movement until the completion of the desired reaction, as determined by the character of the product being made.

The calcined gypsum, known in the trade as stucco, is discharged through gates at the side, near the bottom, of the kettle, and falls into hot pits. From here it passes, by means of transverse feeders and a screw conveyor, to the boot of a chain and bucket elevator, which delivers it to a storage bin. Final grinding is done in a 5x22-ft. Allis-Chalmers tube mill equipped with manganese-steel liners. Steel balls, $1\frac{1}{4}$ in. in diameter are used, the consumption amounting to about 0.0001 lb. per ton of stucco ground.

The product is delivered in 100-lb. lots to the trade in jute sacks. Alongside the mill a tile-casting plant, with a capacity of 10,000 cu.ft. per day, is in operation. The stucco is pulped with water and delivered to molds. After setting, the tiles are removed by hand and stacked for thorough drying before shipment. They are being used extensively for indoor partition work.

Recently the erection of storage bins to accommodate 6,000 tons of stucco was commenced. An additional sacking machine has also been added to the plant, whereby output can be increased to six 100-lb. sacks per minute.

For permission to visit the plant and for sundry courtesies that permitted the compilation of these notes, I am indebted to K. M. Grier, of the executive department, and to John Schreiner, the production manager for the Blue Diamond Materials Co.



GYPSUM KETTLE IN PLAN AND ELEVATION

How Welding Is Used in

Fabricating Aluminum Stills

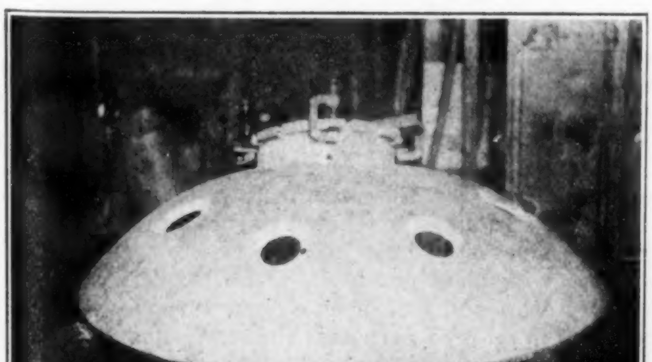
Description of the Methods Used and Results Obtained in Making Several Large Aluminum Rosin Stills by the Use of Oxy-Acetylene Welding

BY FRANK B. HILL
Manager, Bournonville Welding Co., New York City

ALUMINUM vessels possess exceptional qualities for a number of industrial purposes, and especially for the manufacture of chemicals and foods. That aluminum has not been used more extensively for such devices as retorts, stills, agitators and digesters is largely due to the difficulty encountered in fabricating heavy plates and sheets of this metal by means other than oxy-acetylene welding. The characteristics of aluminum which make riveting impracticable in many cases also reject other joining methods. Several large stills recently built of ¾-in. thick aluminum plate by the Bournonville Welding Co. demonstrate, however, the practicability of fabricating heavy sections of this metal by the oxy-acetylene process.

When the company accepted a contract to build several 1,900-gal. capacity rosin stills of ¾-in. cold-rolled aluminum it was apparent that considerable experimental work would be necessary to develop the best methods and practices for doing the work. There were no precedents to follow, but long experience in oxy-acetylene welding a variety of cast and rolled aluminum products helped considerably in determining the methods to be employed. The practices that are followed on lighter aluminum work have been applied with excellent results to the fabrication of the stills.

There is a great similarity in the methods used to weld aluminum plate and steel plate. The familiar practices recommended for the latter serve to good advantage on aluminum plate ¼ in. thick and heavier with but few exceptions. Adequate and careful preheating is very essential on all aluminum work, but the ordinary method of playing the blowpipe flame on the parts adjacent to the weld section before beginning a weld, which is good practice on aluminum sheet, is not sufficient when handling aluminum plate.



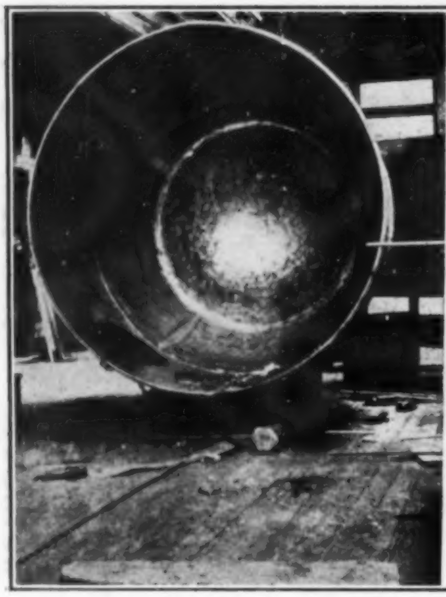
Top section, with blow-off connection in place ready to weld and showing bevel on opening for pipe connections.

The stills are built according to the user's specifications and contain twelve separate pieces of ¾-in. plate; a dished top and bottom, to each of which are welded four segments that form the sides and two semi-circular pieces forming the waist or center sections. The pieces are cut to a predetermined size at the mill. These are received flat and are formed to shape, and prepared for welding by beveling the edges to 45 degrees in the welding shop. A hydraulic press specially constructed for the purpose and large wooden mallets are used to form the sections to shape. Great care is exercised in forming the sections to avoid delay and trouble in fitting and matching the parts during the welding. Preparations for welding are also carefully carried out, because once the welding of an aluminum joint is begun, it should be finished with the fewest interruptions possible. Openings for fittings and connections, which are cut after the sections have been formed, are also beveled to 45 degrees and chipped to a clean smooth surface with an air chisel. It is necessary to bevel all weld edges so the weld can be penetrated to the full thickness of the plate.

METHOD OF PREHEATING

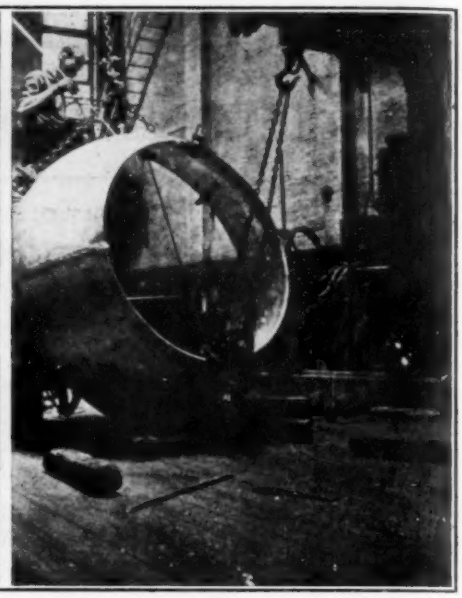
Two 2-in. air and gas torches are used for preheating. The metal is preheated to nearly the melting point in semi-circular sections 6 in. on each side of the line of weld and just ahead of the operator as the welding advances. This permits fusion of the edges and the addition of the welding rod at a rapid rate and consequently speedy execution of the work. But the principal reason for preheating is to compensate for the force of expansion and contraction, and local preheating has proved sufficient. Had more extensive preheating been necessary, this could have been done without trouble, although more time, of course, would have been required. The operators who weld the stills have been thoroughly trained in handling aluminum and it has never been necessary to go over the work, a process that should be avoided on heavy aluminum. Upon completion of the first still a test was made subjecting the vessel to 150 lb. cold water pressure, and no leaks showed. This in itself was quite remarkable when consideration is given to the amount of welding, 308 linear feet.

The stills are fabricated progressively, from the bottom section up. Seams are only slightly reinforced by building up and, as the photographs indicate, are not finished off. A drawn aluminum rod of assured quality and of about the same analysis as the plate is used for a filler. That careful preparation, preheating and welding are worth while is witnessed by the fact that the first still constructed required the removal of less than $\frac{1}{16}$ in. of metal to fit the last segment in position.



Bottom with first and second row of plates welded in place

Bottom with first row of plates welded in place



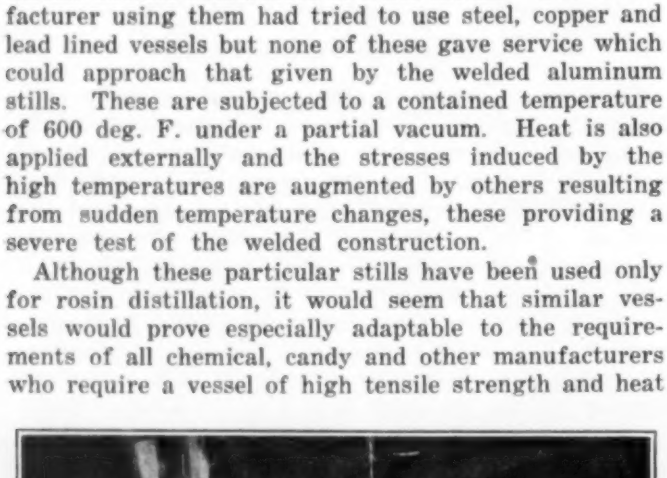
Upper ring of plates being welded and nearly ready for top to be placed

Tests on subsequently built stills proved these were in comparatively perfect alignment and according to specifications.

The fittings and connections consist of one 10-in. blow-off hole and six 4-in. flanged pipe connections. These are all cast aluminum and are oxy-acetylene welded to the cold-rolled aluminum top section. The joining of these two differently processed metals is a particularly noteworthy part of the welded fabrication.

Stills of this type have been in use for some time and have thoroughly demonstrated their superiority over similar devices constructed of other metals. The manufacturer using them had tried to use steel, copper and lead lined vessels but none of these gave service which could approach that given by the welded aluminum stills. These are subjected to a contained temperature of 600 deg. F. under a partial vacuum. Heat is also applied externally and the stresses induced by the high temperatures are augmented by others resulting from sudden temperature changes, these providing a severe test of the welded construction.

Although these particular stills have been used only for rosin distillation, it would seem that similar vessels would prove especially adaptable to the requirements of all chemical, candy and other manufacturers who require a vessel of high tensile strength and heat conductivity, that is not subject to chemical reaction, that can be easily cleaned and that is comparatively economical to manufacture. Aside from the advantages of aluminum over other metals in these fields, the all oxy-acetylene welded construction, which provides a practically seamless and consequently leak-proof vessel, is almost sufficient recommendation in itself for the use of an all-welded aluminum vessel in preference to other types.



The completed still.

Georgia Clays Prove Valuable in Ceramic Manufacture

Co-operative work between the Department of the Interior and the Central of Georgia Railway to determine the value for ceramic use of various clay deposits of Georgia has been concluded at the Ceramic Experiment Station of the Bureau of Mines, Columbus, Ohio. The work was divided into five parts: Clay washing; laboratory work on the crude and washed clays; manufacture and testing of refractory materials; manufacture of vitrified face bricks; and manufacture of white ware.

Washing tests on some of the most promising clays were made in the special washer developed by the Bureau of Mines. These tests, supplemented by laboratory tests to determine the burning, shrinkage and other properties of the clays, showed that some of the clays were suitable for manufacture of white ware. Others proved to be excellent filler material, and the Southern station of the Bureau of Mines is using these washed clays in plant practice tests in the filler trade.

The clays selected in general are, if properly prepared, suitable for the manufacture of refractories. Therefore, 20 tons of a selected clay was made up into fireclay shapes at a large manufacturing plant in accordance with plant practice. These bricks have been tested in doors and roof of an electric furnace for melting steel, in oil-fired furnaces; for steel-pouring ladles; in boiler settings; in ceramic kilns; and as bungs in furnaces for making malleable iron. They gave exceptional service in practically all tests.

Experiments are in progress to develop face brick from certain of these clays, and present results indicate that a satisfactory product will be obtained.

The Modern Concept of Solid Solutions

How They Are Visualized by the Metallurgist of Today and a Presentation of Working Information Regarding the Constitution and Properties of Alloys

BY ZAY JEFFERIES AND R. S. ARCHER
Metallurgists of the Aluminum Company of America

In Two Parts. Part I.

IF WE prepare an alloy of pure copper with a small amount of zinc, say 1 per cent, and examine its structure under the microscope, we find that it contains only one constituent, the grains of which appear homogeneous and alike, except for orientation, and quite similar to the crystalline grains of pure copper. Mechanical and physical tests of the alloy show that in general its properties do not differ much from those of pure copper. Other alloys can be prepared containing gradually increased percentages of zinc, and it is found that each alloy consists of a single homogeneous constituent the hardness, strength, ductility, color and electrical conductivity of which depart from those of copper in an entirely gradual manner as the percentage of zinc is raised. These homogeneous alloys the properties of which thus vary continuously with composition are classed as solid solutions of zinc in copper.

Metallic Solid Solutions Are Crystalline—Molten glass is a liquid solution the properties of which change continuously as its temperature is lowered, until at room temperature it has acquired the rigidity which is the usual criterion of the solid state. Its constitution is apparently unaltered; it is still a solution. Ordinary glass might, therefore, be called a solid solution, although there are many who consider that such amorphous materials should be classed as undercooled liquids rather than as solids, the term "solid" being reserved for those materials which, because of their crystalline structures, possess permanent rigidity. At any rate, the term "solid solution," as used in metallography, is applied only to crystalline materials. Metallic solid solutions, like those of zinc in copper, exhibit all of the evidences of crystallinity shown by the pure metals, such as slip bands, etching pits of regular shape, twin crystals, directional reflection of light and diffraction of X-rays.

Mixed Crystals—The German "Mischkrystalle" has been applied not only to metallic solid solutions but also to materials which do not possess the degree of homogeneity that we associate with solid solutions, such as a composite crystal consisting of a core of one substance surrounded by a sheath of another (isomorphous) substance. For this reason and because the idea of a mere mechanical mixture is conveyed too strongly, the English translation, "mixed crystals," is an objectionable term. It is now almost entirely supplanted by the term "solid solution."

Diffusion in Solid Solutions—One of the most marked characteristics of solutions in general is their tendency to become homogeneous by the process of diffusion. This tendency is abundantly manifested in metallic solid solutions, which are seldom homogeneous as cast, but attain homogeneity by diffusion.

An alloy of copper with 15 per cent of zinc, for example, begins to freeze with the formation of crystalline nuclei of nearly pure copper. As the temperature falls, these crystals grow, by the deposition of material, gradually richer in zinc. When the alloy is completely solid, it is an aggregate of grains the zinc content of which increases gradually from the center to the boundary. On prolonged heating of the casting at a sufficiently high temperature, say 800 deg. C., diffusion takes place until the alloy is chemically homogeneous throughout. The process of homogenization is greatly assisted by mechanical working, so that it is readily brought about by the ordinary processes of working and annealing incident to the manufacture of brass.

Atom Substitution in Solid Solutions—When sufficient opportunity is allowed for diffusion, the copper-zinc alloys, or brasses, consist of a single homogeneous constituent until zinc is present up to about 36 per cent. Examined with the X-ray spectrometer, these alloys show only one pattern, that of the face-centered cubic lattice characteristic of pure copper. No signs are found of the presence of crystalline zinc, which is hexagonal, even with more than 30 per cent of zinc present. The most simple and natural conclusion is that the zinc atoms are occupying the positions of some of the copper atoms in the face-centered cubic lattice. In other words, zinc atoms have been substituted for some of the copper atoms.

This conclusion is supported by the observed relation between the densities of the alloys and their lattice dimensions. If the lattice kept the same dimensions as those of copper, then the brasses would all have higher densities than copper, since the zinc atom is slightly heavier than the copper atom. The densities of the brasses are actually less than the density of copper, and the cube edge of the copper space-lattice is found to increase with the addition of zinc. The density of any given alloy can be readily calculated from the measured lattice dimensions and the atomic weights of zinc and copper, on the assumption that the zinc atoms are replacing copper atoms. Densities so calcu-

lated agree with measured densities to a degree which indicates the validity of the assumption.

Chromium is soluble in solid nickel, and alloys containing up to 60 per cent of chromium show only the nickel pattern with the X-ray spectrometer. There is no evidence of the body-centered cubic pattern characteristic of free chromium. The chromium atoms must have replaced nickel atoms in the nickel space-lattice.

Solvent and Solute—It is readily apparent that in the case of some metallic solid solutions we have a definite criterion by which to distinguish solvent from solute. The metal the space-lattice of which persists in the solid solution is to be regarded as the solvent.

This criterion fails when two metals having the same type of space-lattice form a continuous series of solid solutions. The solvent may then be arbitrarily defined as that element the concentration of which in the solution exceeds 50 atoms per cent.

In general it seems that the atoms of the solute replace atoms of the solvent, but it is quite possible that in some cases the solute atoms are distributed between the solvent atoms, rather than in place of them. This is probable especially when there is a limited solubility of an element the atoms of which are small as compared with those of the solvent, as in solutions of carbon in iron.

Limited Solubility—When the amount of zinc in the copper-zinc alloys exceeds about 36 per cent by weight, a new constituent appears. The solid solutions containing up to 36 per cent of zinc, which are isomorphous with copper, are designated by the letter alpha, and the new constituent which appears on further addition of zinc is called the beta constituent. This constituent also seems to be a solid solution, in that its composition can be varied, within certain limits, without the production of discontinuous changes in properties. The X-ray spectrometer shows that the beta solution has a body-centered cubic lattice, as distinguished from the face-centered cubic lattice of copper and the hexagonal lattice of zinc. An alloy containing copper and zinc in equal atomic proportions, represented by the formula CuZn, consists entirely of the beta constituent. This alloy may be considered to be a definite compound which serves as the basis or solvent for the beta solid solutions.

The solubility of zinc in copper is thus limited to about 36 per cent, although solid solutions are formed containing higher percentages of zinc, but based on different solvents.

When solid solubility is exceeded, the new constituent which appears is more often a compound than a solid solution. Solid aluminum, for example, will hold in solution a maximum of about 5 per cent of copper. When this amount is exceeded, the compound $CuAl_2$ appears as an excess constituent. Theoretically, perhaps, no two substances are completely insoluble in each other, and on this basis it might be said that the $CuAl_2$ holds some aluminum in solution. Practically, however, such solubility is very slight, and we may regard the excess constituent as a substantially pure compound.

Complete Solubility—Both copper and nickel crystallize with the face-centered cubic lattice and with approximately equal lattice dimensions. The solubility of nickel in copper (or copper in nickel) is complete. All of the alloys consist of a single structural constituent, showing a face-centered cubic lattice the dimensions of which change gradually from those of pure copper to those of pure nickel.

It is apparent that two metals cannot possess complete mutual solubility in the solid state unless they have the same space-lattice. Before the development of the modern conception of solid solutions, it was considered that complete solubility existed between certain pairs of metals which were of different crystalline structure, such as nickel (face-centered cubic) and chromium (body-centered cubic). Sometimes a single apparently homogeneous constituent is seen under the microscope, but shown by X-ray analysis to contain two different space-lattices. The diagram in Fig. 1 gives the results of spectrographic analysis of the nickel-chromium alloys. Up to more than 60 per cent of chromium the only pattern observed is that of nickel. From about 65 to 93 per cent of chromium two patterns—those of nickel and chromium—are observed, showing the simultaneous existence of two different solid solutions. Alloys containing still higher percentages of chromium show only the chromium pattern.

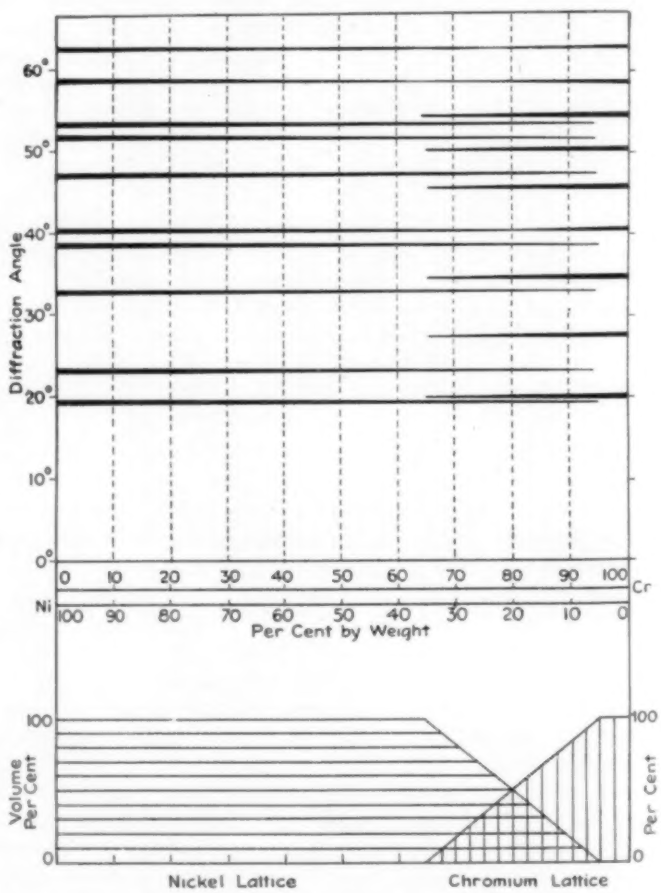


FIG. 1—CONSTITUTION-PATTERN DIAGRAM OF NICKEL-CHROMIUM SYSTEM

Solubility Limits Vary With Temperature—The limits of solid solubility in alloys vary with temperature, just as do the limits of solubility of solutes in aqueous solutions.

The solubility of Fe_3C in iron, for example, decreases from about 1.7 per cent at 1,130 deg. C. to 0.90 per cent at 725 deg. C. At this temperature there is an abrupt change in the constitution of the solid solution, and the solubility falls off abruptly to less than 0.10 per cent.

The solubility of $CuAl_2$ in aluminum decreases from

Our knowledge of alloys has been greatly increased during the last few years (especially since the introduction of the X-ray spectrometer) by the evolution of new conceptions regarding solid solutions.

In the normal course of events in any line of endeavor, progress is made in theory, followed by progress in practice. Theories are evolved and discussed and used as a basis of experiments. There finally comes a time when some concepts are discarded and the others are widely accepted and combined to give a useful collection of working information. This point has been reached in the case of solid solutions, which form at least part of the structure of nearly every metal. The authors have compiled the accepted useful information and it is being presented in two parts, of which this is the first.

about 5 per cent at 540 deg. C. to about 2.5 per cent at room temperature.

Solubility does not always decrease with falling temperature. The solubility of zinc in copper (alpha solution) is about 31 per cent at 900 deg. C. and about 37 per cent at room temperature. A similar direction of change obtains in the alpha solutions of tin and aluminum in copper.

The direction of the effect of temperature on solubility is governed by the heat effect accompanying solution, in accordance with the generalization of LeChatelier. If the dissolving of a substance involves an absorption of heat, then a rise in temperature will increase its solubility. If, on the other hand, a substance goes into solution with evolution of heat, then its solubility will decrease with rising temperature.

Ordinarily the process of solution is an energy-absorbing process. As has been pointed out, the dispersion of a solute in solution is analogous to its vaporization, and hence requires energy. There are some substances, however, that dissolve in water with an evolution of heat. This is generally considered to be due to the formation of hydrates.

Conditions in metallic solutions differ quite materially from those in aqueous solutions. The formation of complete molecules, or even the existence of such molecules, in solution is usually not to be considered. On the other hand, it is possible that in some cases the dissolving of a constituent does not really involve increased dispersion. The saturated (alpha) solution of zinc in copper, for example, contains approximately one atom of zinc to two atoms of copper. The phase or constituent with which this solution is in equilibrium is the beta constituent. The beta constituent is a solid solution based on the compound CuZn as a solvent, in which copper can be regarded as the solute. The dispersion of the copper in the pure solvent is indicated by the atomic ratio; that is, one atom of copper to one atom of zinc. Consider a beta solution of the composition assumed for the alpha solution; that is, one containing a total of two atoms of copper to one of zinc. One of these two copper atoms might be regarded as a solute atom and the other as a solvent atom. The concentration of the solute would then be expressed as one atom of solute to two atoms of solvent, exactly as in the case of the alpha solution of one atom of zinc to two of copper. The alpha and beta solutions assumed may therefore be regarded as of comparable dilution. The heat effect of a change from one to the other would therefore be difficult to predict on the basis of the relative degrees of dispersion of the solute.

When the excess constituent is a substantially pure compound, as in the case of Fe_3C and $CuAl_2$, this consideration is not involved. The passing of carbon from crystalline Fe_3C into solution in iron obviously represents increased dispersion of the carbon atoms, and the disappearance of crystalline $CuAl_2$, the copper going into solution in the aluminum, evidently results in increased dispersion of the copper atoms.

The facts seem to be in accord with these considerations. Those cases in which the concentration of the solute in the saturated solid solution decreases with rise in temperature are generally cases in which the excess constituent in equilibrium with the solution in question is itself a solution. When the excess constituent is a substantially pure compound, metal or metalloid, its solubility as a rule increases with rising temperature.

The magnitude of the effect of temperature on solid solubility is more difficult to predict than the direction of the effect.

Solidification and Melting of Solid Solutions—Solid solution alloys generally freeze and melt throughout a range of temperature, in contradistinction to pure metals, chemical compounds and eutectic mixtures, all of which freeze and melt at constant temperature.

The freezing point of a metal may be either lowered or raised by the addition of an element which goes into solid solution in it. Thus the freezing point of copper is raised by the addition of nickel, but is lowered by the addition of manganese. Both nickel and manganese have melting points higher than the melting point of copper.

When a molten alloy capable of forming a solid solution cools to a certain temperature, solidification begins with the formation of crystals which do not have the composition of the liquid alloy, but are richer in the element the addition of which to the alloy would raise its freezing point. In the cases just mentioned, the first solid to form from a molten alloy of copper and nickel would be richer in nickel than the alloy as a whole; while the first solid to form from a molten alloy of copper and manganese (providing the alloy contained less than a certain critical amount of manganese which produces a minimum freezing point) would be richer in copper than the alloy as a whole.

The separation from the melt of solid material of a different composition from the average composition of the alloy results in an enrichment of the melt in that constituent the addition of which to the original alloy would have lowered its freezing point. From the melt thus enriched, further solidification takes place only after a fall in temperature. The solidification of the alloy continues in this manner while the temperature gradually falls.

The solidified alloy is not of uniform composition, because of this progressive manner of freezing, unless the rate of cooling is so slow that homogenization by diffusion keeps pace with solidification. This is ordinarily not the case, but the "cored" alloy can be rendered homogeneous by annealing, as described in the discussion of diffusion. On reheating such a homogenized solid solution, melting takes place by a gradual process which is essentially a reversal of the freezing process. Melting begins at spots within the grains and at the grain boundaries, the first liquid to form being richer than the alloy as a whole in that element the addition of which to the molten alloy would lower its freezing point. The crystals continue to melt grad-

ually throughout a range of rising temperatures which under conditions of equilibrium is identical with the temperature range of solidification.

Reference was made above to the fact that a certain alloy of copper and manganese has the lowest freezing point of the series. Similar minima are found in other solid solution systems, an alloy containing 80 per cent gold and 20 per cent copper, for example, having the lowest freezing point in the copper-gold series. These solid solution alloys of minimum freezing point solidify and melt at constant temperature and without the segregation due to progressive solidification.

Annealing Temperatures of Solid Solutions—The recrystallization temperature of a metal is generally raised by the addition of a solute. The recrystallization temperature of copper, for example, is raised by the addition of zinc, in spite of the fact that both the recrystallization temperature and the melting point of zinc are lower than those of copper.

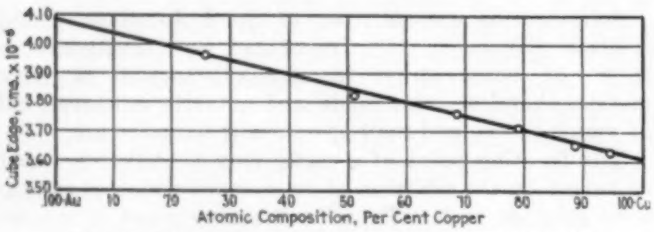


FIG. 2—SIZE OF FUNDAMENTAL CUBE IN THE COPPER-GOLD SERIES

If, however, the solute has a markedly lower recrystallization temperature than the solvent and dissolves in sufficiently large quantities, then its low recrystallization temperature may finally assert itself and the solid solution may recrystallize at lower temperatures than the solvent. Copper and nickel are completely soluble in each other in the solid state. The recrystallization temperature of copper is about 150 deg. C., while that of nickel is about 600 deg. C. The addition of a few per cent of nickel to copper raises the recrystallization temperature of the copper gradually, but considerable nickel must be added before the recrystallization temperature of the alloy is as high as that of pure nickel. If the nickel be regarded as the solvent in these solutions and copper as the solute, then it may be said that the addition of copper to nickel, in sufficient quantities, lowers its recrystallization temperature. In general, the recrystallization temperature of a solid solution is higher than that of its lowest melting constituent, but not necessarily as high as that of the constituent of higher melting point.

When the melting point of a metal is lowered by the addition of a solute, the temperature at which it can be annealed is thereby restricted, and since its recrystallization temperature is at the same time raised, the result is a narrowing of the temperature range for annealing. There is not as much latitude in the annealing of the alpha solid solutions of zinc, tin and aluminum in copper as there is in the annealing of pure copper.

Density of Solid Solutions—It appears that the densities of binary solid solution alloys are usually equal to or greater than the values calculated from the densities of the constituent elements. In alloy systems in which the constituent elements are completely soluble in the solid state, there seems to be a tendency for the actual densities of the alloys to correspond closely with the calculated densities. The effect of composition on the length of the elementary cube edge is shown graphically for the copper-gold alloys in Fig. 2.

The solid solution of zinc, tin and aluminum in copper have densities higher than the calculated values. Table I shows this comparison for copper-zinc.

The space-lattices of some of these brasses have been determined by the X-ray spectrometer, and, as mentioned above, the densities calculated from the lattice dimensions agree very well with the observed values.

Since the alpha brasses are less dense than copper in spite of the greater atomic weight of zinc, the lattice dimensions are larger than those of copper. This expansion of the copper space-lattice by the insertion of zinc atoms seems quite natural in view of the larger atomic volume of zinc. Similar expansions are noted in the alpha solutions of tin and aluminum in copper. As in the case of the copper-zinc alloys, however, the increase in lattice size is not as great as that calculated from the atomic volumes of the elements. Five atoms per cent tin should increase the volume of the copper 9.3 per cent, but actually the increase is only 4.6 per cent. The addition of 18.8 atoms per cent of aluminum should cause a volume increase of 7.5 per cent, but the actual increase is only 2.8 per cent. It is notable that in all of these cases intermetallic compounds form when the solubility is exceeded.

TABLE I—DENSITIES OF COPPER-ZINC ALLOYS

Per Cent Zinc	Density by American Brass Co.	Density by Bureau of Standards	Calculated Density (by Rule for Mixtures)
0	8.93	.....	....
3	8.892	8.890	8.87
5	8.867	8.866	8.82
10	8.807	8.804	8.72
15	8.745	8.734	8.62
20	8.679	8.667	8.52
25	8.599	8.594	8.42
28	8.568	8.553	8.37
30	8.533	8.528	8.33
32	8.502	.....	8.29
33.33	8.493	8.476	8.26
35	8.478	8.460	8.23
37	8.437	8.437	8.20
40	8.396	.....	8.14

Whether or not such contractions are general in alloys showing limited solubility and forming intermetallic compounds when the solid solubility is exceeded is not known. It might appear that the volume contractions just described are due to a resistance of the copper to a change in lattice dimensions, since the atoms of zinc, tin and aluminum are all larger than the copper atom, and the stretching of the copper lattice is in all cases less than the amounts calculated from the atomic volumes. If this were the case, however, it would be expected that the addition of a smaller atom to a solvent would decrease its lattice dimensions less than the calculated amount. Measurements have been made by Bain on silver-zinc alloys which indicate that this is not true. Zinc dissolves in silver in the solid state, a compound being formed when the limit of solid solubility is exceeded. The atomic volume of zinc is less than that of silver. There should therefore be a contraction of the silver lattice on the addition of zinc. The actual contractions observed are greater than those calculated from the rule for mixtures.

It thus seems from the limited evidence available that the general tendency is for solid solutions of metals which are completely soluble in each other to have densities about equal to those calculated from the densities of the metals; when solid solubility is limited and the excess constituent is a compound, the solid solutions tend to be more dense than calculated.

Aluminum Paint for Outside Work

A Satisfactory Formula Developed for Minimizing Volatilization in Oil Tanks

BY JUNIUS D. EDWARDS
Assistant Director of Research, Aluminum Company of America

AN OIL storage tank must resist strong forces which seek to volatilize its valuable contents. On a bright, sunny day the radiation from the sun may amount to as much as 4 to 5 or more B.t.u. per square foot per minute. This would mean, to take a concrete case, that an oil storage tank having a projected area normal to the sun's rays of 1,000 sq.ft. would be receiving heat at the rate of about 4,500 B.t.u. per minute. If all this heat were to be absorbed by the oil, it would be sufficient to raise the temperature of 1,200 gal. of oil about 1 deg. F. per minute.

Of course, it does not do this. The surface of the tank reflects more or less of the sun's rays. Air currents also dissipate heat effectively, and probably in most cases the major part of the heat absorbed by the tank is carried away by such currents passing over it; particularly when there is a lively breeze is this true. A certain amount of heat is also lost by radiation from the walls of the tank. However, it is obvious that anything that can be done to decrease the heat absorbed by the tank will be advantageous in maintaining the temperature of the oil as low as possible and hence minimizing volatilization losses.

ADVANTAGES OF ALUMINUM PAINT

There is a wide selection of paints that can be used for this purpose. Some black paints, for example, may reflect only 5 or 10 per cent of the sun's rays, whereas there are other highly reflecting paints that will reflect 70 per cent or more of the solar energy. Aluminum paint is proving to be a very efficient material for coating oil storage tanks. Its high reflectivity, 65 to 70 per cent, enables it to reflect the major portion of the sunlight falling upon the tank. In addition, aluminum paint has a hiding power excelled by no other paint and is an excellent protective coating for steel. Its durability has been demonstrated by a series of tests inaugurated by Henry A. Gardner, of the Institute of Paint and Varnish Research, about 3 years ago. A recent examination of these panels demonstrated that aluminum paint properly made would protect steel under relatively severe conditions for at least 3 years, with a satisfactory prospect of much longer life.

In the Oct. 29 issue of *Chem. & Met.*, page 792, the Bureau of Mines published a brief statement of experimental work it had been conducting on minimizing volatilization losses from oil tanks by proper coating of the tank surface. The following is quoted from this announcement:

"Tinplating and aluminum paint give the best results. However, neither of these finishes is practicable for outside work, as iron coated with tin corrodes rapidly, and aluminum paint soon loses its gloss and becomes flaky."

Although it is gratifying to learn that the bureau's results coincide in part with ours—namely, that aluminum paint is highly efficient thermally in protecting oil storage tanks—nevertheless the bureau's statement that aluminum paint is not satisfactory for outside work is quite astonishing in the light of the evidence obtained by the Institute of Paint and Varnish Research, as well as other extensive data available. One must assume that the Bureau of Mines was unfortunate in its selection of an aluminum paint for this purpose.

A highly satisfactory aluminum paint for this purpose can be made by mixing 2¼ lb. of what is known as Standard Varnish Polished Aluminum Bronze Powder with 1 gal. of spar varnish, thinned with about 1 pt. of mineral spirits so as to give a smoothly spreading paint. The Institute of Paint and Varnish Research recommends spar varnish meeting the U. S. Federal Specifications Board's Standard Specification No. 18 for this purpose. This is a high quality spar varnish, and in barrel lots can be obtained for something less than $1.50 per gal. at the present time.

Canada Seeks Home-Ground Non-Metals

The possibility of establishing grinding plants in Canada to produce the many varieties of finely ground non-metallic minerals used in Canadian industries is the subject of a comprehensive report prepared in the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics. Heretofore the bulk of the supply has been derived from importations.

With the exception of sulphur in the native state, whiting and some special grades of clay, Canada possesses important deposits of almost all the nonmetallics most commonly used in industries. The minerals now being consumed in Canada in the ground or prepared form are: actinolite, barytes, calcite, whiting, dolomite, corundum, feldspar, fluorspar, gypsum, lime, magnesite and magnesia, mica, iron oxides, quartz or silica, including silex and flint, tripolite, and talc. Of these, gypsum and magnesite are produced in considerable tonnages, are calcined and otherwise prepared in Canada and supplied in the ground form and larger sizes to consumers both in Canada and abroad. Talc is ground and produced in several marketable grades which are shipped to consumers throughout Ontario and Quebec as well as the United States. Lime is mainly used as crude quicklime in the building trades, pulp manufacturing, sugar and glass-making industries and a limited amount is used as lime-flour. Actinolite, quartz, feldspar and mica are now being prepared to a limited extent in Canada.

Purification of Aluminum Sulphate Solutions

The success of experimental work on the purification of copper sulphate solutions and zinc sulphate solutions, made by the Department of the Interior at the Pacific experiment station of the Bureau of Mines, suggested that possibly aluminum sulphate solutions could be purified of iron compounds and thus provide a much needed cheap process of producing iron-free alum and other aluminum salts, which are now twice as costly as the less pure salts and yet are used in large tonnages by the baking powder makers and the paper mills, and for water purification. At present, deposits of clay low in iron are the only ones that can be used for chemical purposes. Three different modifications of a laboratory method for hydrolytical removal of iron from aluminum sulphate solutions were worked out. Further experimentation is being conducted by the Bureau of Mines with a view to developing this method into a practical process for preparing pure alumina direct from clays for use in the aluminum industry.

Flow of Fluids

The Article Published Herewith Has Significant Bearing on the Technology of This Unit Process and as Such Is of Interest to Production Men in the Chemical Engineering Industries

How Electric Motors Should Be Applied to Pumping Equipment

Notes From the Experience of a Great Electrical Manufacturing Company Which Will Help the Chemical Engineer Select and Operate His Pumping Equipment

By R. H. Rogers
Power and Mining Engineering Department, General Electric Co.

PUMPING is a fundamental operation in all industrial plants which lends itself admirably to electric drive. The selection of pumps, motors and control for the most successful operation under all conditions and circumstances is not a simple problem and if not well studied out the plant is penalized continuously through the following years. The fact that some of the major industries with well-organized engineering departments are operating many pumps with characteristics entirely unfitted for the service would indicate that this branch of engineering needs some explaining, especially for those who have little time for an intensive study of its problems.

The clearest way to show all the elements that affect the overall efficiency of electric pumping units is to analyze the whole span from the electric meter to the work accomplished,

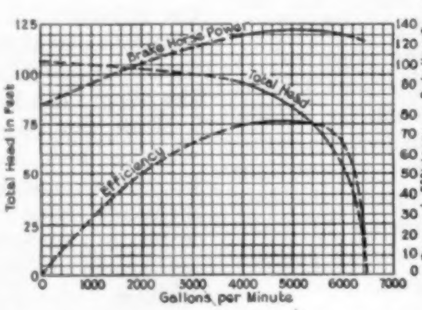


FIG. 2—CENTRIFUGAL PUMP CURVES FOR CONSTANT SPEED

not overlooking other items that make an installation successful. The items that directly affect the kilowatt-hours per million gallon feet are:

Ratio of Dynamic Head to Static Head. The vertical tape measurement from level to level (the static head) or the calculated head if pumping against, say, boiler pressure is not the measure of the pump's work. Every foot of pipe, every valve, every elbow or other fitting adds to the theoretical head to make the actual or dynamic head.

For instance, considering only pipe diameter, a 5-in. three-stage centrifugal delivering 400 g.p.m. through 300 ft. of 5-in. pipe will cost $375 per year more to operate than if a 10-in. pipe were used. This differential would pay for the larger pipe in a year. Tables of heads to be added for sizes of pipes, valves, elbows, etc., at various velocities are available in pump catalogs and handbooks and they deserve close consideration.

In general the piping should have much greater area than the pump openings, as high velocity is essential in the pump but very detrimental in piping. Six to eight feet per second should not be exceeded and less is desirable, for, once installed, the loss goes on for years.

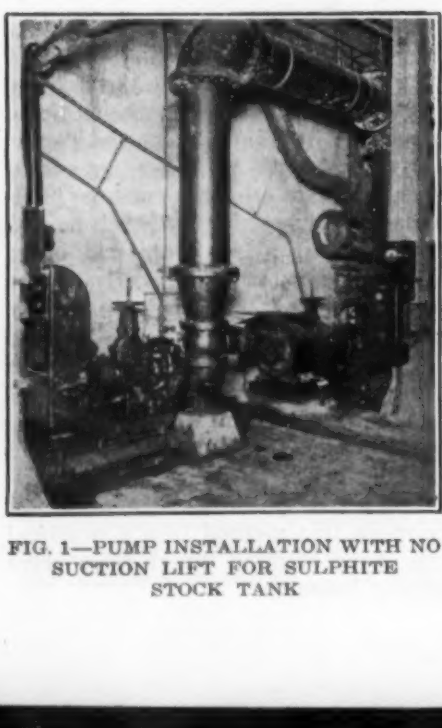


FIG. 1—PUMP INSTALLATION WITH NO SUCTION LIFT FOR SULPHITE STOCK TANK

The suction pipe of the pump should be deeply immersed, should be as short as is practical consistent with good installation practice and the bends, if any, should be of long radius.

An excess of dynamic head over static head means just that much more work for the motor forever after and if it is 10 per cent or 50 per cent, that excess will show up at the meter.

Fig. 1 shows pump installations with no suction lift, as they are placed alongside the sulphite stock tank. The piping is very liberal in size, so that the difference between dynamic and static head is slight.

Pump Characteristics. Head, gallons per minute, efficiency, revolutions per minute and horsepower plotted together show the character of a centrifugal pump. If the speed at the point of best efficiency is at or near an induction motor speed—viz., 1,730, 1,150, 865, 690 or 575—it will insure its operation at the most efficient point if direct-connected to a squirrel-cage induction motor.

If the horsepower required at the most efficient point is near one of the standard squirrel-cage motor ratings —viz., 200, 150, 125, 100, 75, 60, 50, 40, 30, 25 hp., etc.—it will insure a high overall efficiency for the set. Fortunately induction motors have a very flat efficiency curve through the working range, such as 90 per cent at full load, 90.5 per cent at 75 per

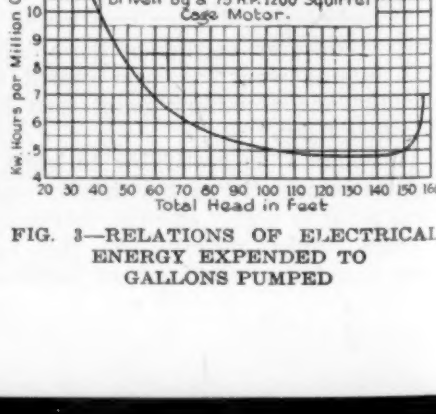


FIG. 3—RELATIONS OF ELECTRICAL ENERGY EXPENDED TO GALLONS PUMPED

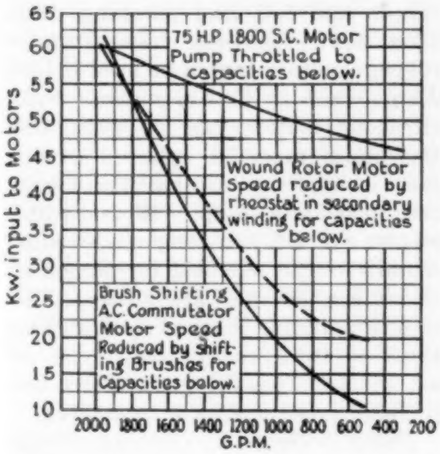


FIG. 4—RELATIVE OUTLAY IN KILOWATT-HOURS FOR WOUND ROTOR AND BRUSH-SHIFTING MOTORS

cent load and 90 per cent at 50 per cent load, so that this feature has little effect. However, the power factors of such motors require that they be operated at near full load to keep the current to a minimum. Power factor affects only the leads and generating system and not the meter except as the rates may be adjusted to penalize low power factor in a plant. At loads as above, the power factor may be in the order of 89, 87 and and 80 per cent.

A desirable characteristic in centrifugal pumps is that of having the load fall off each way from the best operating point. This prevents an overload coming on the motor by an accident or mishandling of valves, which would subject it to maximum head (closed off) or minimum head (direct discharge).

Fig. 2 shows typical centrifugal pump curves for constant speed. The efficiency is high and fairly flat from 70 to 97 ft. head and from 4,000 to 5,600 g.p.m., hence the pump could be efficiently applied between these limits. The horsepower falls off both ways so that the motor cannot be overloaded.

Operating Off Rating. Pumps are rated naturally at their best operating point, and any deviation in speed, head or delivery will result in a higher cost per unit of duty.

While some future conditions may have to be given consideration, operating at lower than rated head should be avoided, especially where a constant speed motor is used. Fig. 3 shows the variation in kilowatt-hours per million gallon feet pumped by a 10-in. centrifugal direct-connected to the constant speed motor, which gives the highest overall efficiency at the pump rating.

The gallon-feet pumped in a year at 135-ft. head for $9,100 (2c. per kilowatt-hour) would cost $17,000 if pumped at 45-ft. head with pumps of this class. This difference of $7,900 per year is not out of line with many pumping duty costs that may be found among the misapplied pumps in industrial plants.

Choice of Motor. For constant speed service either induction motors of the squirrel-cage type or synchronous motors may be used. Synchronous motors improve the power factor for the plant and this item may be enough to justify the valve manipulation incident to starting centrifugal pumps with such motors, together with the complication of bringing d.c. excitation to the motor. There is little difference in the efficiencies of the motors mentioned.

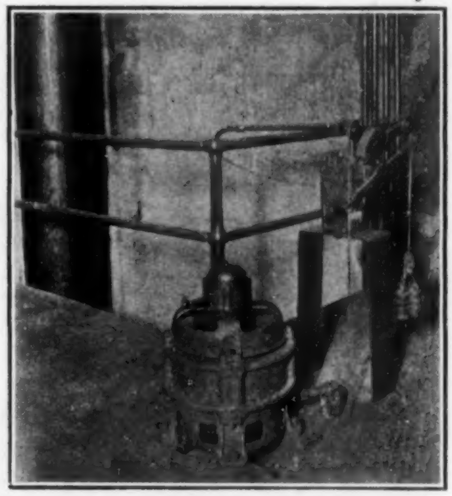


FIG. 6—VERTICAL SQUIRREL-CAGE MOTOR

Direct connected to a sump pump, controlled by a float switch through an automatic compensator.

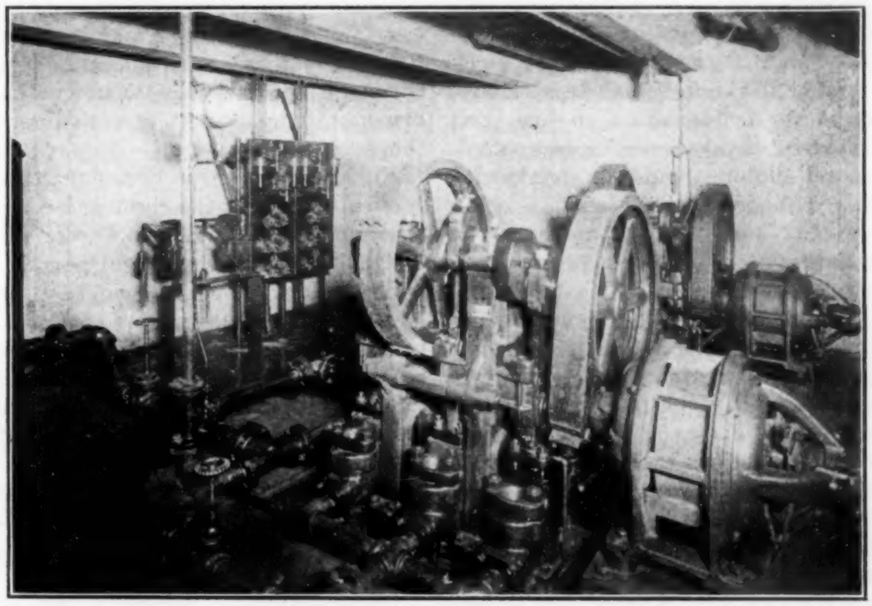


FIG. 7—WOUND ROTOR MOTORS CONTROLLED BY AUTOMATIC PANELS AND FLOAT SWITCHES

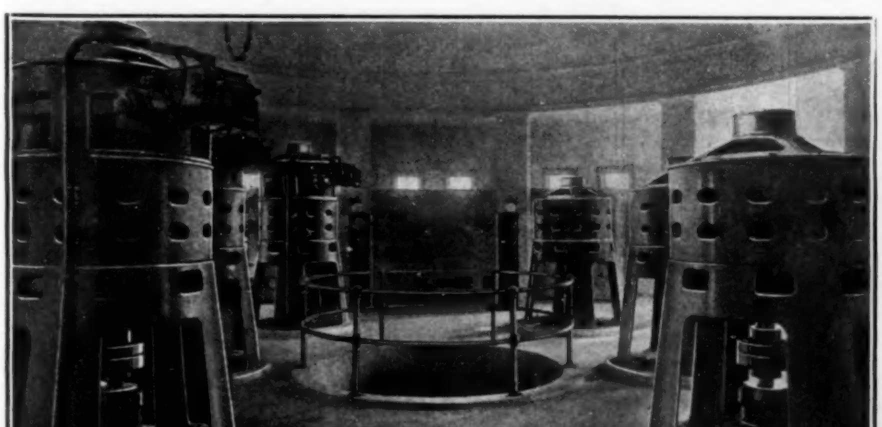


FIG. 5—RIGHT: THREE BRUSH-SHIFTING VERTICAL MOTORS DRIVING CENTRIFUGAL PUMPS. LEFT: THREE SQUIRREL-CAGE VERTICAL MOTORS DRIVING CENTRIFUGAL PUMPS

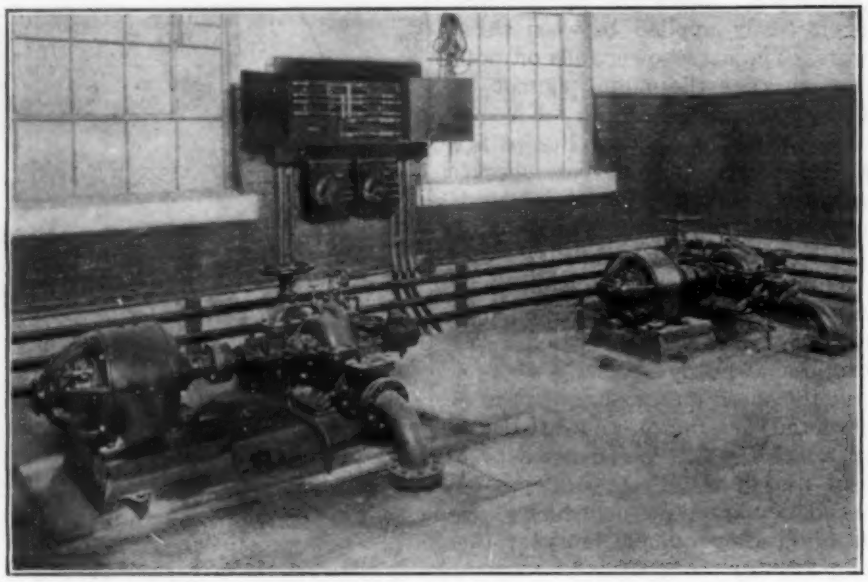


FIG. 8—COMPOUND WOUND MOTORS IN A NITRATE PLANT, CONTROLLED BY FUSED DISCONNECTING SWITCHES AND HAND STARTERS

For direct-current service the shunt-wound motor is not well adapted for centrifugal pump drive, as it is too sensitive to load and voltage changes. A compound-wound motor should be used with only a moderate series field, say 10 per cent, and such motors have been standardized for centrifugal pump service.

For adjustable speed pump drives wound-rotor motors or the brush-shifting, commutator type of motors may be used. The latter have much higher efficiencies at reduced speeds, and this justifies their higher cost if operated at below normal speed frequently or for long periods. Fig. 4 shows the relative outlay in kilowatt-hours for an adjustable speed pump using wound-rotor and brush-shifting motors. The third curve shows the high cost of throttling to get reduced output.

It will be noted that at 60 per cent of normal pump output, the brush-shifting motor would operate 24 hours for $10.72; the wound-rotor motor for $14.88; the squirrel-cage with throttled pump for $25.20. The differences become greater upon reducing the output still more.

Vertical motors may often be used to great advantage by locating the pump at whatever depth may be necessary below the room floor. This reduces or eliminates the suction lift with consequent benefit to the overall efficiency. Where grit is present in the water or the pump is inaccessible, the entire weight of the revolving parts may be carried on a suspension thrust bearing at the top of the vertical motor. This allows of easy inspection and maintenance. Vertical motors are available in synchronous, squirrel-cage, wound-rotor, brush-shifting and direct-current construction.

Fig. 5 shows three brush-shifting vertical motors at the right and three squirrel-cage vertical motors at the left, all driving centrifugal pumps.

Squirrel-cage motors can be used on centrifugal pumps up to 500 hp., provided the inrush of starting current is not objectionable. Wound-rotor motors start with much less line disturbance and are used for that reason even when intended for constant speed duty. Synchronous motors are not usually installed below 75 hp. and are of course for constant speed duty only.

Reciprocating pumps, rotary pumps and screw pumps have heavy starting duty due to high breakaway torque and full load pumping duty from start. For these reasons squirrel-cage motors cannot be used if line disturbance is objectionable. Synchronous motors can be used, but the pump must be relieved of its load in starting so that the motor can pull into step. Wound-rotor motors for a.c. and compound-wound motors for d.c. are best for pumps of this class, as they are possessed of strong starting characteristics. The brush-shifting commutator type of a.c. motor is equally good where adjustable speed operation is desired.

Pump Control. Squirrel-cage motors are controlled by manual or automatic compensators, to which may be attached disconnecting switches and ammeters. The automatic compensators may be actuated by a push button at some convenient point, by a float switch, by a thermostat or by a diaphragm pressure switch. Fig. 1 shows a manual compensator with ammeter attached. Fig. 6 shows a vertical squirrel-cage motor direct-connected to a sump pump and controlled by a float switch through an automatic compensator.

Wound-rotor motors for constant speed duty are controlled by an automatic panel actuated by push button, float switch or the like. Fig. 7 shows wound-rotor motors controlled by automatic panels and float switches. The heavy starting duty on the reciprocating pumps determined the type of motors used.

Where adjustable speed is required or it is desired to control the starting by hand, a manual rheostat is provided in the secondary circuit, while the line contact is made by a manual or magnetic switch. Synchronous

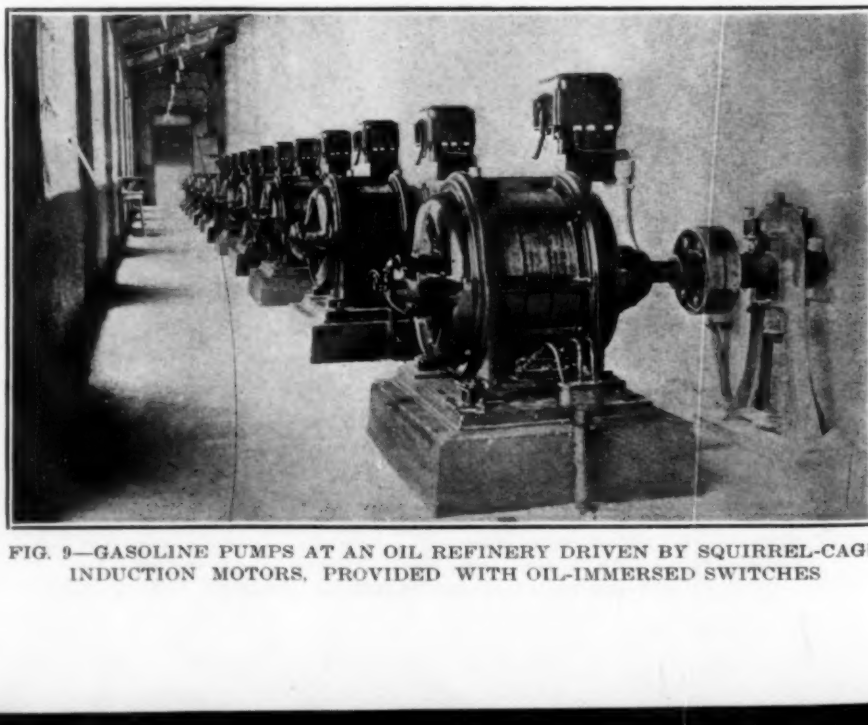


FIG. 9—GASOLINE PUMPS AT AN OIL REFINERY DRIVEN BY SQUIRREL-CAGE INDUCTION MOTORS, PROVIDED WITH OIL-IMMERSED SWITCHES

motors are commonly controlled by a compensator and a field discharge switch.

Brush-shifting motors require only some form of line switch with overload protection and a mechanical means for shifting the brushes. This may be a hand wheel, a shipper rod or a small pilot motor actuated by remote push buttons. Reference to Fig. 5 will show this form of speed control on the three brush-shifting motors at the left. The master panel is in the center background.

Compound-wound direct-current motors for centrifugal pumps require a disconnecting switch and a hand starter. If adjustable speed is required, a manual field regulating rheostat is added.

Direct-current motors may also be controlled by magnetic panels actuated by push button, float switch or the like, as in the case of the a.c. motors. Fig. 8 shows compound-wound motors in a nitrate plant controlled by fused disconnecting switches and hand starters all neatly arranged.

Control apparatus in all cases should be fully inclosed and provided with overload and undervoltage protection. Where it is desired to have the motor restart by itself after an under-voltage shut-down, undervoltage release should be specified. Undervoltage release must also be provided if the motor is to be started by a float switch or other auxiliary circuit closing device.

The presence of explosive gases or of especially corrosive acid fumes necessitates the submergence of contact making parts in oil. Such control items are available for all classes of pump service. Fig. 9 shows a battery of motor-driven gasoline pumps in a refinery. The switches are of the oil-immersed type, and as a squirrel-cage motor has no moving contacts, there is no danger of starting a fire or explosion.

Fig. 10 shows an acid pump being driven by a 40-hp. squirrel-cage motor, which is in no way injured by the fumes, as there are no vital parts exposed. This motor is controlled by a standard compensator which has its contacts submerged in oil.

Pump Service. In conclusion it is to be noted that motor-driven pumps are successfully coping with every exacting class of service in industrial plants. Liquids, whether thick, light, volatile, acid or what not, are all being handled under manual or automatic control with the greatest facility. The flexibility of electric drive allows the plant engineer to draw a straight line from level to level, put the pump in the line practically without bends, with the assurance that he can bring the power to the pump without any loss in efficiency or inconvenience to the plant.

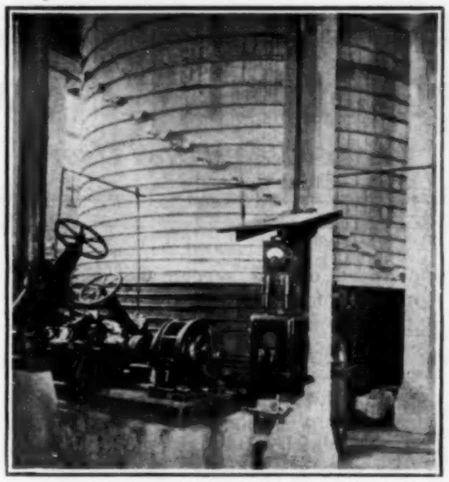


FIG. 10—AN ACID PUMP DRIVEN BY A 40-HP. SQUIRREL-CAGE INDUCTION MOTOR

Centrifugal vs. Gravitational Force

Principles Involved in the Industrial Resolution of Oil Emulsions*

IT IS NOT generally realized that centrifugal force and gravity have two distinct functions: First, subsidence wherein the suspended globules are brought into contact; second, coalescence (when this is possible) by rupturing the films around the globules. In the case of a water-in-oil emulsion, an exercise of the former function alone would yield: (1) oil, free, or as free as desired, from water; and (2) a concentrated water-in-oil emulsion—concentrated in the sense that it contains a relatively large percentage of the internal phase. An exercise of both functions will yield: (1) water-free oil and (2) oil-free water.

Centrifugal force is much better than gravity for subsidence because, in the case of industrial emulsions where the suspended globules are visible under a microscope, subsidence is directly proportional to the force applied.

Centrifugal force is only slightly better than gravity for coalescence. A minute trace of a proper reagent will immediately do more to nullify the interfacial surface tension opposing coalescence than an indefinite application of the highest attainable centrifugal force. No mathematical analysis has been made to explain the failure of high centrifugal force to induce a decidedly more rapid and more complete coalescence than is obtained by gravity.

The adjustment of the centrifuge rotor depends more on the extent of coalescence that is desired or is possible than on any other factor. One reason for this dependence is to be found in the curious relation between the specific gravity and the hydrostatic pressure of emulsions. The continuous centrifuge works on the U-tube or Florentine flask principle, and for homogeneous liquids the ratio of liquid depths is assumed to be inversely equal to the ratio of specific gravities. But in the case of emulsions where the globules have a diameter of 1 micron or larger, the balanced depths are not inversely proportional to mean specific gravities.

Adjustment of the centrifugal rotor depends on the type of the emulsion. In the case of water-in-oil emulsions, water is assumed to be heavier than oil. Subsidence by centrifugal force will, therefore, move the water globule outward. If the globules coalesce when they come into contact, a continuous water layer will be formed at the periphery. The coalesced water layer is equivalent to "dead" space in the sense that this water layer requires no more work from centrifugal force and yet takes up room in the rotor, thus reducing the capacity of the rotor for the oil phase. On the contrary, the suspended oil globules of an oil-in-water emulsion are presumed to be lighter than the water and will therefore be moved inward by centrifugal force. If the oil globules coalesce, an oil layer is formed at the surface; in this case it is the oil layer that is dead space. If coalescence is not obtained and the suspended globules are merely brought into close contact, the concentrated globules form a viscous, or gelatinous, layer that may also be regarded as dead space.

There are cases in which a partial coalescence may be obtained by centrifugal force. Such cases are frequent with water-in-oil emulsions and rotors are specially designed for this condition.

*Extracts from a paper by E. E. Ayres, Jr., presented at the Tulsa meeting of the American Institute of Mining and Metallurgical Engineers, October, 1923.

Equipment News

From Maker and User

Equipment for Screening Various Materials

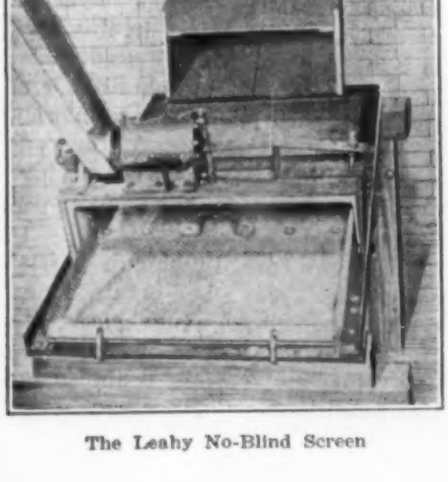
After 2 years operation on various industrial material, the Leahy "No-Blind" Screen has been placed on the general market by the manufacturer, the Deister Concentrator Co., Fort Wayne, Ind. This screen is offered as suitable for use in screening many wet and dry materials, among which are minerals, coal, coke, ceramic materials, sand, gravel and similar substances.

The general appearance of the screen is shown in the accompanying illustration. In its construction, a wire screen cloth is held taut in longitudinal tension in a stationary frame by means of tension bolts. A quick return differential motion is imparted through a connecting bolt to a rigid member attached to and extending transversely across the under side of the screen cloth. The sides of the screen are turned up and are free to vibrate.

The vibrating mechanism consists of a shaft equipped with a pulley and a steel cam having eight teeth. The cam engages the foot of a tappet, which has a vertical movement in guides. The movement of the tappet is transmitted to the screen cloth through the connecting bolt. A leaf spring governs the engagement between tappet and cam, an adjusting nut governing the spring tension.

In operation, the foot of the tappet jumping off the cam tooth returns with an accelerated motion, which terminates in an "anvil" action when the tappet foot again strikes the surface of the cam. The downward motion is slower as the tappet foot follows the cam surface.

The normal amplitude of the screen vibration is about $\frac{1}{16}$ in. directly under the vibrator. The screen cloth at the upper end of the screen has a slight vibration, just sufficient to stratify the material, enabling the "fines" to pass through the meshes. More nearly under the vibrator, a more intense vibration is present and is desirable for "cleaning up" or passing through the particles which are just under the size of the screen openings. Advantage is taken of this in placing the vibrator two-thirds the way down the screen rather than at the center. Material coming on the screen is stratified on the first section of the screen where most of the "fines" pass through. The remaining area of the screen cloth performs "unhindered" screening, accomplishing close sizing.



The Leahy No-Blind Screen

The principal advantages claimed by the maker for this equipment are its simplicity, economy of operation and low first cost. Other advantages include the imparting of vibration to the entire surface of the screen cloth, the fact that the particles of material are screened and stratified according to their relative masses and the finer particles are screened freely without hindrance from the oversize particles, and the "anvil" action of the return which serves to clear the meshes of the screen and render it non-blinding under all conditions.

Edge Filtration

Filters Which Operate on a Principle Which, While Not New, Has Never Before Been Commercially Applied

A short description of the filter invented by Dr. Hele-Shaw was published in the London correspondence of *Chem. & Met.* for July 23, 1923. It is now learned that the construction and distribution of this device have been taken over by the Stream Line Filter Co., engineers, 64 Victoria St., Westminster, S. W., 1, London, England. The filters were exhibited at the recent machinery show at the Olympia, London, where they attracted much attention.

The principle of filtration upon which this device operates is called edge filtration. The liquid being filtered does not pass through a porous filtering medium, but passes in thin films between laminæ of the material. With this particular design the filter is made up of a pack of perforated sheets of a suitable paper, a piece of which has been photographed and is shown in Fig. 1.

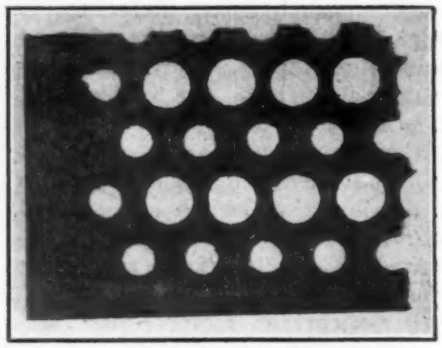


Fig. 1—Portion of a perforated paper sheet from a stream line filter.

These sheets are perforated as shown in the photograph, so when they are stacked together, continuous passages through the pack of paper are formed. The paper has a slight "matt" to its surface, so that, no matter how tight the sheets are pressed together mechanically, minute passages for the liquid remain.

The liquid is introduced through the larger of the two sizes of holes in the pack of paper sheets. The filtrate gradually passes between the sheets and is drawn out from the smaller sized passages, while the residuum collects on the walls of the larger sized passages. These last-mentioned passages are provided with plungers which are passed through as desired and serve to remove the residuum which has collected and so keep the passage clear and prevent the flow of filtrate from being checked.

The liquid, in passing from the larger passages to the smaller, takes a path indicated in Fig. 2. This is called stream line flow and the filter has received its name from this characteristic.

In the filter shown in Fig. 3 the twenty-four packs of perforated papers are each compressed between a pair of perforated plates, the screws shown on the right of this figure being used for this purpose. The liquid to be filtered is led through pipes, as shown, to the inlet taps *A*, which communicate to a gridiron arrangement of channels in the perforated plate on the inlet side. The liquid passes through these chan-

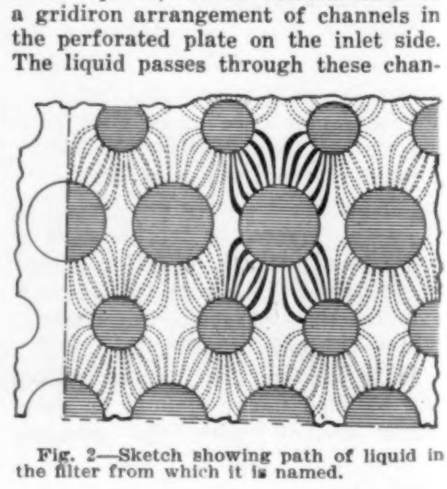
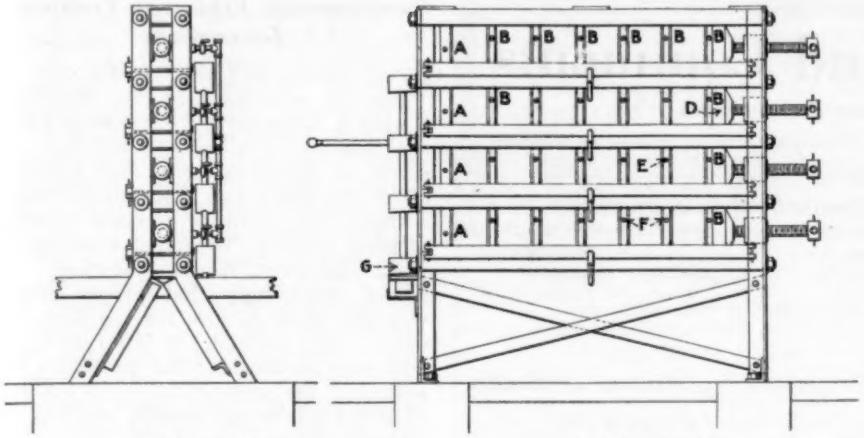


Fig. 2—Sketch showing path of liquid in the filter from which it is named.



End elevation Side elevation

Fig 3—Layout of horizontal type of stream line filter having twenty-four packs, comprising 34,000 paper sheets and a capacity of 1,200 gal. per hour (water at 60 deg. F.). *A*—Inlet taps. *B*—Outlet taps. *C*—Blow-out plugs. *D*—Cast-iron cross- heads. *E*—Gun-metal section plates. *F*—Gun-metal perforated plates. *G*—Wooden trough lined with lead for filtrate.

nels into holes which correspond to the inlet holes in the pack of paper. The plate on the outlet side has holes which correspond to the above, through which the residue can be removed, and holes corresponding to the outlet holes in the pack, which do not go clear through but empty in various channels in the plate, for removing the filtrate.

According to the uses so far proved for this filter, it is rather a clarifier than a filter proper. The makers claim that it removes all color from solutions of dyes and from dirty oil, that it clears water that has clay or other substance in suspension and that it separates emulsions of oils. Another claim for it is that it will remove sugar from weak solutions, thus making a saving in evaporating costs. Other uses have been suggested along similar lines.

Safety in High-Frequency Induction Furnaces

In order to assure absolutely safe operating conditions, as well as to improve efficiency, the Ajax Electrothermic Corporation is now supplying a new hydrogen discharge gap for users of the Ajax-Northrup high-frequency induction furnace. The advantages claimed for this gap over former models using alcohol vapor are as follows:

1. More power is attained promptly and consistently.
2. Gap insulators do not break.
3. It is seldom, if ever, necessary to clean gap.
4. There are no fumes.
5. It is quiet.

The cost of hydrogen is about 2 cents per cubic foot in New York. A tank costing \$4 lasts many days, and the cost is therefore negligible.

The changes regarding safety were not made because there had been any accidents with the old type of gap, but are in the nature of an added precaution. In the gap, sparking takes place between two solid electrodes and a surface of mercury. Some of the mercury becomes vaporized. It is to do away with any possibility of the escape of this vapor and consequent occurrence of mercury poisoning in the operator that the new gap is constructed.

This new style gap is fed with hydrogen gas instead of alcohol and is sealed hermetically. Hence no mercury mist or vapor can escape from it. To those who desire to continue use of the old style gap the Ajax Electrothermic Corporation recommends:

1. That care be taken to keep the cover of the gap tightly fitted on the gap pot.
2. That gloves be used when removing the gap cover and handling the mercury for the purpose of skimming off the deposit on its surface.
3. That a simple type of hood made of thin fiber be arranged over the gap or the whole top of the cage (and with an opening out of the room) and that arrangements be made for a gentle draft through the outlet of the hood.

Attention is also directed to the possibility that the furnace charge when rapidly heated to a high temperature may give off fumes which are highly poisonous. The temperatures attainable in this furnace are so high that most elements can be volatilized and some of them, such as arsenic, lead, osmium, etc., are known to be poisonous. When, therefore, the furnace is being used for heating to high temperatures compounds of uncertain chemical constituents, this heating should be done under a hood which will effectively carry out of the room any deleterious or even disagreeable fumes.

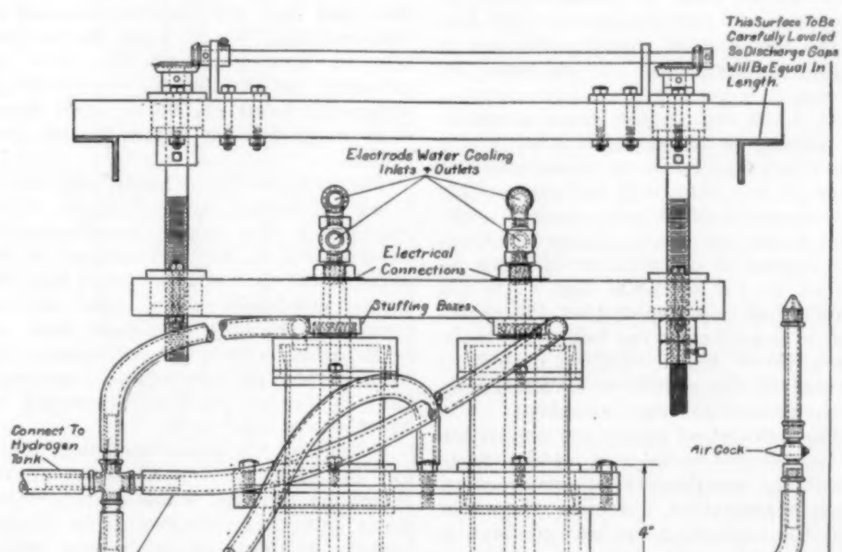
The construction of the new gap is plainly shown in the accompanying sketch. In operation, the hydrogen is let in at the top of the gap and out through a hole at the mercury level. Before turning on the power the hydrogen is allowed to flow through the gap for about 3 minutes. This has been found to eliminate explosions in the gap chamber. The gas emerges from the tip shown at the right of the drawing. As soon as it burns with a soft blue flame it is safe to turn on the power.

A very small flow of hydrogen is sufficient. The valve on the hydrogen tank is adjusted so that a flame about an inch and a half long burns from the outlet tip. The cock which it attached to the outlet tip is then turned off and any hydrogen which escapes passes through the gasket and stuffing boxes at the top of the gap chamber.

The flow of hydrogen may be controlled with any of the standard regulators and gages sold by various companies which supply hydrogen gas and accessories equipment.

Catalog Received

BROWN INSTRUMENT Co., Philadelphia, Pa.—Catalog 30. A catalog on the Brown electrical indicating and recording CO_2 meter described in last week's Equipment News section of *Chem. & Met.*



The New Ajax-Northrup Hydrogen Gap

Readers' Views and Comments

An Open Forum for Subscribers

The editors invite discussion of articles and editorials or other topics of interest

Silica Contamination of Thermocouples

To the Editor of Chem. & Met.:

SIR—The comments and criticisms of John D. Gat in the Oct. 29 issue of *Chem. & Met.*, page 806, relative to my recent paper on "How Silica Protection Tubes Cause Contamination of Thermocouples," page 662, Oct. 8 issue, are highly appreciated.

Mr. Gat questions the statement made that thermocouples are contaminated by silicon vapor formed by the reduction of silica protection tubes, when such tubes have become permeable to reducing gases. These conclusions are based upon observations made by the writer with respect to the behavior of thermocouples using various types of protection tubes. When using other porous tubes, such as alundum or sillimanite, this contamination was not particularly noticeable. However, with silica tubes, with highly siliceous fireclay tubes and with carborundum tubes, the contamination was pronounced.

Similar observations regarding the reduction of silica protection tubes have been made by others. For instance in the Bureau of Standards Technological Paper 170 on "Pyrometric Practice," page 90, this statement is made: "Any reducing gas within the protection tube of a rare metal couple is disastrous, particularly when the tube contains silica. The silica is reduced to silicon, which is readily absorbed by platinum. Above 1,050 deg. C. and even at lower temperatures after prolongued heating, quartz devitrifies and crumbles away." This would seem to indicate that at temperatures slightly above 1,050 deg. C. the reduction of silica is sufficient to cause contamination of platinum by silicon.

At 1,200 deg. C. the vapor pressure of silicon is about 0.06 mm., which would correspond to a dissociation of silica of less than 0.02 per cent. This concentration of silicon vapor is sufficient to contaminate platinum seriously. The degree of dissociation of silica by carbon or CO at 1,200 deg. C. is not known, but it is known that the reduction is quantitative far below the melting point of silica. Silicon carbide is formed in the reduction of silica only in the presence of excess carbon.

The amount of silicon contamination in the couples tested was insufficient to detect by metallographic examination. Such examination did show, however, that the contamination was confined to a thin skin and did not penetrate through the entire cross-section of the wire.

The silica tubes used in the writer's tests were of the translucent type. It is probable that transparent quartz tubes would not exhibit the same ease of devitrification, in which case the contamination of the thermels would be less.

O. A. HOUGEN,
Assistant Professor of Chemical Engineering.
University of Wisconsin,
Madison, Wis.

Preparing Specimens of Metals

To the Editor of Chem. & Met.:

SIR—It is difficult to pass by the article on "A New Method of Preparing Specimens of Metals," published in the Nov. 5 issue of *Chem. & Met.*, without comment, for two reasons: First, it has so much good in it that one cannot help but feel that it is a pity the author did not state the obvious limitations of the proposed method; and second, since it is evidently intended for those teaching classes in metallography, if passed unchallenged wou'd be so far reaching as seriously to retard the progress of metallography in the future. The writer believes, contrary to Mr. Pulsifer, that further advances in metallography can be made only through more painstaking and elaborate preparation of specimens, which need not necessarily take too long a time and which certainly are not academic or opposed to the best obtainable results.

It is readily agreed that surface flow must be reduced to a minimum, but this can be done by proper choice of abrasive, polishing cloth, speed, pressure and wetness of pad. The scratches in Mr. Rawdon's micrographs mentioned are an evidence that the surface flow, if any, has been slight. The scratches are covered up by surface flow, and they are likewise removed by deep etching. We all know the temptation of etching deeply to cover up polishing defects, but all possibility of obtaining detail at 500 or 1,000 diameters magnification is lost by this procedure.

The desirability of deep etching to bring out certain features which do not appear in the usual metallographic examination is well illustrated in the article, and is the good point that deserves emphasis. It is also well to point out that the specimens that are to be deeply etched do not require the same careful preparation as a specimen that is to be examined unetched or after a very light etch.

Do not let the young metallographist get the idea that examination at 100 diameters tells the whole story; rather point out the unlimited field of discovery at high magnification which may be made possible through better methods of preparation of specimens, and improved optical instruments and a better knowledge of their use.

E. H. DIX, JR.
Aluminum Company of America,
New Kensington, Pa.

Fundamental Ethics of Technical Journalism

To the Editor of Chem. & Met.:

SIR—In your issue of Oct. 22, 1923, I note a comment by Eric John Ericson relative to a method for the analysis of fluorspar originated by him about 20 years ago and incorporated without due credit in a recent volume of mine entitled "Technical Analysis of Steel and Steel Works Materials." I regret exceedingly that proper credit was not given to him for the development of this method, but if Mr. Ericson will stop to consider the problems involved in the preparation of a volume of this kind he will readily see why it was not done.

Obviously, in preparing a volume on the analysis of steel and steel works materials where several hundred methods are presented, it is practically impossible to trace every method back to its source and cite the original reference, especially difficult in the case of methods as old as the one in question. I had this very thought in mind in writing the preface to the book, where I said: "In presenting the methods for analysis, naturally no claims are made for any originality; steel analysis is the result of many years development. In fact, steel analysis methods are the result of so many chemists that it is even practically impossible to give credit to whom it is due."

In those cases where I have described a new method or an important modification of an old one I have tried to cite the source, but in the case of old-established methods used for routine analysis, methods used daily in hundreds of works laboratories, it was out of the question. I am sure that a complete bibliography of all of the literature pertaining to the analytical methods given in my book would completely fill at least one issue of *Chem. & Met.*

FRANK T. SISCO.
Dayton, Ohio.

Petroleum Milk and Vaseline Butter

To the Editor of Chem. & Met.:

SIR—When, in your Oct. 15 issue, you opened your columns to discussion of petroleum chemistry, I hoped someone else would be the goat which the case demanded.

I heard Dr. Brooks' Milwaukee paper, and I concluded that he must be in the employ of interests which wanted to prevent use of petroleum for chemical experiments. He seemed to want to make it clear that no chemist could find anything in petroleum not already sold as such. I went out of the meeting almost determined to try vaseline on my bread. I wondered why American Russian mineral oil couldn't be made into an aqueous colloidal suspension which would "take" more like milk and less like oil. I harked back to Perkin's time, and wondered if petroleum isn't already naturally more nearly like butter than tar was like the pretty mauve

dye he made. I assumed that most petrolatums are "straight-chain" compounds, and I recalled being convinced that they can be oxidized. Glycerine type bases and fat type acids could be made from petroleum easier than saccharine from tar, if we could suitably handicap Dr. Remsen. Only it hasn't been done yet, and that statement seems the first risky one I've written so far.

The commercial mind will at once suggest that the cost of petroleum milk and vaseline butter will be so near the present price of oil and petrolatum that these novelties wouldn't be useful. But it isn't solely a question of price. The petroleum industry is alive today not so much because gasoline and oil are cheaper than hay and oats, but because they are better. When the vaseline butter and the mineral oil milk have been well made by the synthetic chemist, we shall wonder how we ever put up with such dirty products as milk and butter from cows, just as we now wonder how we stood it driving behind that dirty horse so long. The wonderfully satisfactory rules of the research game, which now produces new and useful discoveries in chemistry, make it probable that good, hard research work on petroleum will be rewarded. Probably some tools more modern than the still and the "flash test" will be desirable, and colloids, catalyzers and anti-catalyzers will find their place. It's certainly much safer to predict that we shall some day eat vaseline butter than to predict that no one ever will.

W. R. WHITNEY.

Research Laboratory,
General Electric Co.,
Schenectady, N. Y.

Review of Recent Patents

Waterproofing Leather

Composition of Paraffine, Rosin and Rubber Developed for Impregnating Shoe Soles

William C. Geer and John B. Dickson, of Akron, Ohio, have developed a composition adapted to impregnate fibrous material so as to render it impervious to fluids without unduly impairing its flexibility and without rendering the material greasy or sticky. The procedure is as follows:

Equal parts by weight of paraffine and rosin are melted together, heated to about 90 deg. C., thoroughly mixed, and the rosin therein oxidized, as by blowing air or oxygen through the mixture or by treating the same with a non-gaseous oxidizing agent, such as nitric acid. The oxidation causes a precipitate to form in the molten mixture and the oxidation is preferably continued until such precipitation is substantially complete. The molten, supernatant liquid is then decanted or otherwise freed of the precipitate, the latter being rejected, and in 80 parts by weight of said molten liquid is dissolved 10 parts of thoroughly masticated crude rubber, as by stirring the rubber in small particles in the molten mass or masticating it in the presence of the molten liquid. A softener is preferably added to the mixture before, after or during the addition of the rubber, and 5 parts by weight of castor oil has been found suitable as a softener for the materials mixed according to the recipe just given. The resulting product may then be allowed to cool, solidifying to a wax-like condition, in which it may be conveniently handled and shipped, and it may again be brought to a molten condition for use in treating the fibrous material.

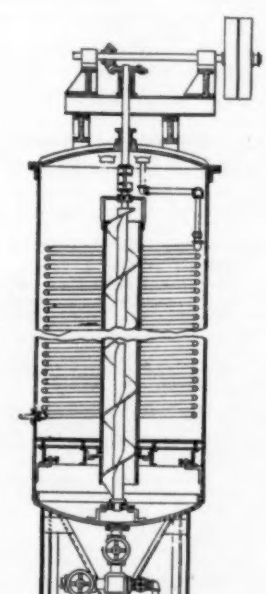
The material may be impregnated by simply dipping it or allowing it to stand in a molten mass of the wax-like substance obtained as above described, for a suitable length of time to become more or less saturated therewith, and it has been found that ordinary chrome tan leather, for example, may be suitably impregnated for sole leather by allowing it to stand in the molten mass for a period of 1 to 2 hours at about 85 deg. C. Such temperature is preferred, because higher temperatures may harmfully affect the leather. (1,470,073; assigned to B. F. Goodrich Co.; Oct. 9, 1923.)

Sodium Silicate Dissolver

Simplified Equipment Developed for Obtaining Concentrated Solutions of a Difficultly Soluble Material

To provide a method for dissolving sodium silicate in water without the use of complicated machinery or expensive agitating means is the object of patent 1,467,342, granted Sept. 11, 1923, to Edward A. Taylor, of Cleveland, and assigned to the Grasselli Chemical Co.

Commercial sodium silicate, which is ordinarily prepared by the fusion of siliceous and alkaline materials in a suitable furnace, is a solid material which is practically insoluble in water at ordinary temperatures and under ordinary conditions. For use in various arts it is necessary, however, to dissolve sodium silicate in water, and considerable difficulty has been experienced in effecting this solution on a commercial scale. In fact, it may be said that this has been accomplished commercially only by the employment of comparatively intricate processes, which involve the use of complicated and expensive machinery.



DISSOLVER FOR
SODIUM SILICATE

As shown in the accompanying illustration, the improved apparatus consists of a vertical cylindrical chamber, in the center of which is an agitating screw surrounded by a cylindrical casing. Solid sodium silicate is introduced through a manhole, filling the chamber from the screen or grill near the bottom up to the top of the casing around the screw. Water is added, the manhole closed and steam circulated through the coil. During the heating, the agitator is run to assist solution as well as to prevent settling of impurities in the bottom or the formation of lumps.

After the pressure in the chamber has nearly reached that in the steam coil, direct steam is fed in through a suitable opening in the top to raise the temperature still higher. When samples show the desired concentration the solution is drawn off through the discharge line in the bottom. As a rule, about one-quarter of the charge remains to be treated with the next batch.

Rubber-Lined Ball Mill

Use of Tough Resilient Material in Place of Hard Steel or Silica Increases Life of Mill Linings

James J. Denny and Rolla B. Watson, of Cobalt, Ont., have discovered the interesting fact that rubber makes an excellent lining for rotary grinding mills. The wear-resisting materials commonly used, such as manganese steel, white iron and silica blocks, are extremely heavy and therefore consume a great deal of power during rotation. A considerable loss is sustained through the wear of the grinding medium operating against the extremely hard liners.

These liners wear out very quickly and require the frequent shutting down of the machines for the purpose of renewal, which in addition to material cost results in a very heavy labor loss.

The improved form of lining developed by Denny and Watson is preferably produced in the form of strips of rubber material substantially the same as that used for the tread rubber of automobile tires, which has been found in practice to be a very efficient resistant to wear.

A lining formed of rubber material, while sufficiently hard to resist wear, is of a very tough nature, but it has sufficient resiliency to cause the steel balls or other grinding medium to rebound therefrom upon impact in such a manner as to avoid disintegration of the liner surface. Further, the rebounding action of the grinding media produces a very marked increase in efficiency in the pulverizing of the ore between such media.

Such a lining is lighter in weight than those heretofore used, consequently the heavily weighted mill will be greatly lightened, with the result that much less power is expended. Furthermore, the replacement of the rubber lining is a comparatively simple matter and may be effected very rapidly. (1,470,597; Oct. 16, 1923.)

Book Reviews

A Mechanical Engineers' Handbook Useful to Chemical Engineers

With the New Edition, Kent's Classic, Indispensable as Ever to the Practicing Mechanical Engineer, Becomes Very Nearly So to the Chemical Engineer

KENT'S MECHANICAL ENGINEERS' HANDBOOK. By the late *William Kent*. Tenth edition, rewritten by *R. T. Kent*, editor-in-chief, and a staff of specialists. 2247 pp. John Wiley & Sons, Inc., New York. Price: Genuine leather, $7; Atholeather, $6.

FROM his first introduction to the art, the mechanical engineer is likely to be as inseparable from his Kent as from his slide rule or lead pencil. This was true in the '90s when Kent's "Bible" was first issued; and as later editions have appeared, it has become true for an ever-widening circle of users. Now, with this tenth edition, the book has become almost as essential for the chemical or other engineer in production work as it is for the mechanical engineer.

No matter how purely chemical the product manufactured in a given plant may be, the engineer responsible for its production will find a large proportion of his time taken up with the solution of mechanical or general engineering problems incidental to this manufacture. As no ordinary man can master all branches of engineering, he must turn to reference books. Of the three or four general engineering reference books which a chemical engineer can use to advantage, Kent is perhaps the most useful.

The new tenth edition is 50 per cent larger than the ninth edition and has become a much more valuable all-around reference work. In the first place, it has been rearranged and is

American Patents Issued November 6, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,472,778—Method of Producing New Organic Arsenic Compounds. August Albert, Munich, Germany, assignor to Roessler & Hasslacher Chemical Co., New York, N. Y.

1,472,790—Manufacture of Sulphuric Anhydride. March F. Chase, Washington, D. C., and Frederic E. Pierce and John Skogmark, New York, N. Y., assignors to Cos Process Co., Inc., New York.

1,472,791—Process of Manufacturing Ammonium Picramate. William M. Dehn, Seattle, Wash.

1,472,831—Apparatus for Cooling Purposes. Walter Hamer, Devonport, Auckland, New Zealand.

1,472,850—Method of Cementation of Boron Into the Surface of Iron or Steel. Takeo Miyaguchi, Sendagayamachi, Toyotamagori, Tokyofu, Japan.

1,472,868 — Process of Centrifugally Separating Refrigerated Ingredients and Centrifugal Bowl Used in Such Process. Cyrus Howard Hapgood, Nutley, N. J., assignor to De Laval Separator Co., New York.

1,472,882 — Process of Making Oils Non-Sludging. Herbert Raymond Moody, New York.

1,472,896—Filter. Samuel Alsop, New York.

1,472,902—Drier. Claude A. Bulkeley, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Wilmington.

1,472,934 — Pulp - Screening Device. Arvin R. Paull, Utica, N. Y., assignor of one-third to Benjamin J. Fisher and one-third to William F. McCann, both of Utica.

1,472,935—Calcining Apparatus. Robert D. Pike, San Francisco, Calif.

1,472,999 — Apparatus for Treating Hides and the Like. Basil Heber Tilston, Latchford Without, near Warrington, and Thomas Melbourne, Warrington, England.

1,473,008—Raw-Material Conveyor for Feeding Glass Furnaces. Wilbur F. Brown, Charleston, W. Va., assignor to Libbey-Owens Sheet Glass Co., Toledo, Ohio.

1,473,060—Method of Electroplating. Edward N. Taylor, St. Louis, Mo., assignor to Walter A. Zelnicker, St. Louis, Mo.

1,473,119—Gas Producers. Frank E. Modlin, St. Joseph, Mo.

1,473,122—Acid Concentrator. John Patten, Baltimore, Md.

1,473,152—Tunnel Kiln Car. Harry D. Lilliebridge, Zanesville, Ohio, assignor to American Encaustic Tiling Co., Ltd., New York.

1,473,160 — Apparatus for the Treatment of Liquids and Liquid Pulps. Hallet R. Robbins, Fierro, N. M.

1,473,208—Acid-Resisting Alloy. Alvah W. Clement, East Cleveland, Ohio, assignor to Cleveland Brass Manufacturing Co., Cleveland.

1,473,209 — Washing Apparatus for Fibrous Materials. Robert W. Cook, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester.

1,473,217-9—Cellulose-Ether Composition. John M. Donohue, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester.

1,472,259—Process of Forming Sodium Compounds. Carl Sundstrom and George N. Terziev, Syracuse, N. Y., assignors to Solvay Process Co., Solvay, N. Y.

1,473,285 — Rubber Composition and Method of Making the Same. Harry L. Fisher, Akron, Ohio, assignor to B. F. Goodrich Co., New York.

1,473,295—Method of Recovering Bromine. Coulter W. Jones, Midland Mich., assignor to Dow Chemical Co., Midland.

1,473,316—Process of Producing Low-Boiling Oils. George L. Prichard and Herbert Henderson, Port Arthur, Tex., assignors to Gulf Refining Co., Pittsburgh, Pa.

1,473,327 — Antifreeze Composition. Frederick William Sperr, Jr., Pittsburgh, Pa., assignor to Koppers Co., Pittsburgh.

1,473,331—Filter. Heinrich Bechhold, Frankfort-on-the-Main, Germany.

1,473,347—Art of Producing Chemical Reactions. William Hoskins, Chicago.

1,473,350—Method of Effecting Solution of Substances and Removing Coatings From Bodies. Victor Lenher, Madison, Wis.

1,473,373 — Evaporator. Martin J. Kermer, Evanston, Ill.

1,473,396—Process for Manufacturing Soap. John W. Bodman, Western Springs, Ill., assignor to William Garrigue & Co., Inc., New York.

1,473,402 — Process of Refining Oil. Chauncey Blair Forward, Urbana, Ohio.

1,473,421—Centrifugal Separator. Charles W. Eccleston, Los Angeles, Calif., assignor to Centrifugal National Concentrator Co., Los Angeles.

1,473,447 — Process of Decomposing Sulphides. Mathias Ovrom Sem, Christiania, Norway, assignor to Det Norske Aktieselskab for Elektrokemisk Industri, Christiania.

1,473,491—Method and Apparatus for Treating Materials for Filtering, Decolorizing and Similar Purposes. Fred W. Manning, Brooklyn, N. Y., assignor to Manning Refining Equipment Corporation.

1,473,510—Process of Producing Carbides of Sodium and Boron. Charles E. Parsons, Englewood, N. J.

1,473,543 — Catalyst and Method of Making the Same. John Collins Clancy, Providence, R. I., assignor to Nitrogen Corporation, Providence.

1,473,550—2.7-Dialkyl-3-Dialkylamino-6-Amino-10-Alkylacridinium Salts. Heinrich Grünhagen, Berlin-Karlshorst, Germany, assignor to Actien Gesellschaft für Aniline Fabrikation, Berlin, Germany.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

now supplied with an improved system of indexing. A section and section-contents index appears in the fore part of the book. Before each section is placed a detailed table of contents for that section. And at the close of the book is a comprehensive subject index. The twenty-six sections now include all the important phases of engineering which can possibly be included under the heading "mechanical" and, in addition, there are sections on electrical engineering, construction and metallurgy.

Among the sections that will be of real help to the practicing chemical engineer are the following: In the sections on "Materials" and "Strength of Materials," the standard commercial dimensions and properties of all the materials commonly used in engineering are listed, together with condensed but adequate directions for their selection and use. The sections on "Iron and Steel," "Non-ferrous Metals and Alloys" and "Corrosion" contain much material which is indispensable to the user of metals in the chemical plant and is here collected for the first time in handy shape. The sections on "Mechanics," "Heat," "Air," "Water, Hydraulics and Water Power" give much valuable information on the fundamental mechanical engineering which a chemical engineer must use. And finally, the material on "Fuels and Combustion," "Steam Power," "Gas Power" and "Refrigeration" treats of subjects which are chemical as well as mechanical engineering.

In particular, the references to metallurgy are to be commended. The authorities who have compiled this part of the work include such names as: W. H. Bassett, C. H. Bierbaum, W. M. Corse, J. A. Gann, Zay Jeffries, C. H. Mathewson, P. D. Merica, F. N. Speller, Bradley Stoughton, J. F. Thompson and Enrique Touceda. The data which they have provided on the use of metals in industry make available numerous facts which have been hard to come by in the past and which will prove of great help to all who, not trained in metallurgy, must still employ metals continually in their work.

The feature of this handbook which has always contributed most largely to its popularity has been the many reference tables—tables covering just about the whole range of subjects that come up in normal mechanical engineering practice. In this new edition, the number of tables has been greatly increased, those formerly used have been brought up to date and much additional explanatory matter has been added. Many of the tables give dimensions and capacities of equipment which formerly have been obtainable only from manufacturers' catalogs. This one thing will be, in many cases, worth all the other matter in the book, as anyone will realize who has been under the necessity of making hurried purchase of new equipment when catalogs were not available.

The writer has always felt that he could not get along without his Kent. Now that the book has been modernized and extended, there will be many others to join him in this opinion. To paraphrase somewhat a reviewer's cliché, here is a book that no engineer who expects to engage actively in his profession can afford to be without.

GRAHAM L. MONTGOMERY.

Important Articles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

NEW METHODS OF PREVENTING CORROSION OF STEEL. An abstract of an article from *Revue de Métallurgie* on the use of chromium salt solutions in emulsions, paints and concrete for protection of steel. *Iron Age*, Nov. 8, 1923, p. 1253.

A NOVEL TYPE OF FILTER. *George W. Fuller.* An abstract of a paper on the "Stream Line" filter given at the Conference on Pollution of Streams by Industrial Wastes, Philadelphia, Oct. 16, 1923. *Eng. News-Record*, Nov. 8, 1923, p. 770.

SOME NOTES ON THE DEHYDRATION OF WATER-GAS TAR EMULSIONS. *L. J. Willien.* A description of some experimental work that demonstrates how foaming may be overcome by distilling under pressure. *Gas Age-Record*, Nov. 10, 1923, pp. 581-583.

FIRE PROTECTION IN STEEL PLANTS. *James M. Woltz.* A paper of the National Safety Council on preventing and fighting fires due to special hazards of the metal industries. *Iron Age*, Nov. 8, 1923, pp. 1255-1256.

THE CHEMIST AND INDUSTRY. *J. H. West.* In an interesting comment on a preceding discussion of this subject Mr. West brings out very clearly the relations between the chemical engineer and the industrial chemist. *Chem. & Ind.*, Oct. 26, 1923, pp. 1024-6.

ARTIFICIAL RESINS, VARNISHES AND LACQUERS. *Rex Furness.* Cumarone, phenol-formaldehyde, furfural, acrolein and naphthalene-formaldehyde resins are described and compared. *Chem. & Ind.*, Oct. 19, 1923, pp. 1000-4.

SEPARATING THE COMPONENTS OF PETROLEUM. *P. F. Gordon.* A review of industrial process is followed by report of experimental methods aimed at more complete separation. *Chem. & Ind.*, Oct. 19, 1923, pp. 405T-414T.

PAINT STRUCTURE. *Henry Green*, of N. J. Zinc Co., shows how study of structure gives an insight into many typical paint problems. *Can. Chem. & Met.*, November, 1923, pp. 285-6.

CANADA'S PULPWOOD RESOURCES. A brief explaining the status of the pulpwood-consuming industry in Canada in relation to reserves as presented by the Canadian Pulp and Paper Association to the Commission on Pulpwood at Ottawa, Nov. 6, 1923. *Pulp & Paper Magazine*, Nov. 8, 1923, pp. 1093-1100.

Calendar

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, seventy-fifth anniversary meeting, University of Cincinnati, Cincinnati, Ohio, Dec. 27 to Jan. 2.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, winter meeting, Washington, D. C., Dec. 5 to 8. Headquarters at the Willard Hotel.

AMERICAN PETROLEUM INSTITUTE, fourth annual meeting, Statler Hotel, St. Louis, Mo., Dec. 11 to 13.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, annual meeting, New York City, Jan. 22 to 25, 1924.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, Dec. 3 to 6.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, annual convention, New York City, Dec. 3 to 5.

AMERICAN SOCIETY OF SAFETY ENGINEERS, annual meeting, New York City, Jan. 18, 1924.

COAL MINING INSTITUTE OF AMERICA, annual meeting, Pittsburgh, Pa., Dec. 19 to 21.

ENGINEERING INSTITUTE OF CANADA, annual general meeting, Montreal, Jan. 22, and Ottawa, Jan. 23 and 24, 1924.

FEDERATED AMERICAN ENGINEERING SOCIETIES, annual meeting, Washington, D. C., Jan. 10 and 11, 1924.

FRANKLIN INSTITUTE, annual meeting, Philadelphia, Jan. 16, 1924.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATION ENGINEERS, fourteenth annual convention, Memphis, Tenn., Dec. 12 to 16.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING, Grand Central Palace, New York, Dec. 3 to 8.

NEW JERSEY CLAY WORKERS' ASSOCIATION AND EASTERN SECTION AMERICAN CERAMIC SOCIETY, annual meeting, New Brunswick, N. J., Dec. 19.

POWER AND MECHANICAL ENGINEERING NATIONAL EXPOSITION, Grand Central Palace, New York, Dec. 3 to 8.

SOCIETY OF AUTOMOTIVE ENGINEERS, annual meeting, simultaneously with the Detroit Automobile Show, General Motors Bldg., Detroit, Mich., Jan. 22 to 25, 1924.

Electric Furnace for Iron and Steel

THE ELECTRIC FURNACE FOR IRON AND STEEL. By *Alfred Stansfield*, Birks Professor of Metallurgy, McGill University. 453 pp., illustrated. New York: McGraw-Hill Book Co. Price, $5.

In the preface of this book the author says: "This book is intended to contain a reasonably complete account of the electric smelting of iron ores to make pig iron and the making of steel from metallic materials in the electric furnace." The author has carried out his intention and done a great deal more. Not only is a very good account given of the various methods of smelting iron ores and making steel in the electric furnace, but the equipment and furnaces that are in general use today are very well described. It is our opinion that it would be greatly to the disadvantage of any man occupied in the type of work with which this book deals not to read the book and have it on his desk to refer to as the necessity arises. In the few days that the book has been on our desk we have twice referred to it for the answer to some unusual question with regard to electric furnaces and each time we found a better answer than we could have obtained after considerable correspondence with furnace manufacturers and the loss of several days' time. The book consists of three parts. The first contains historical matter, an outline of the metallurgy of iron and steel, and an account

of the electrical supply needed by smelting and steel making furnaces. The second part describes the electric smelting of iron ores for pig iron, the reduction of the ores in the state of powder for subsequent melting in the electric furnaces, and the production of ferroalloys in electric furnaces. The third part deals with the production of iron and steel from metallic materials and the various types of electric furnaces in use for this purpose, and includes a chapter on the production of steel from iron ore.

CLIFFORD B. BELLIS.

New Publications

ALCOHOL FOR INDUSTRIAL PURPOSES. A synopsis of the rules and regulations prescribed by the Internal Revenue Department. Published by the U. S. Industrial Alcohol Co., 110 E. 42nd St., New York City, November, 1923. The industries dependent upon alcohol as an essential raw material have long felt the need for a concise interpretation of the government's restrictions on the distribution and use of this commodity. Furthermore, the development and approval of new formulas for specially denatured alcohol have been so rapid that few other than those directly concerned have kept abreast of the situation. Here in this pamphlet the compilers have reviewed the composition of the accepted formulas and have cataloged their authorized industrial uses. A valuable appendix gives the detailed technical specifications for the various denaturants.

Men in the Profession

E. R. ALEXANDER, at one time with the research and biological laboratory of E. R. Squibb, is the president of the Alexander Laboratories, just incorporated, in Kansas City, Mo. It expects to feature a product to prevent clouding of glass with moisture.

GEORGE H. BUFORD, formerly chemist for the Consolidated Flour Mills at Newton, Kan., has taken a similar position with a milling company at Ogden, Utah.

H. L. CALMAN of New York has been elected first vice-president of the Varnish Manufacturers' Association. L. V. PULSIFER, of the same city, has been elected second vice-president.

R. E. COLLOM has resigned as State Oil and Gas Supervisor of California. With the exception of an interval of 1½ years as petroleum technologist for the U. S. Bureau of Mines, Mr. Collom has been identified with the work of the Department of Petroleum and Gas, California State Mining Bureau, in various capacities since 1915, the year of its inception. He has been supervisor since January, 1921. He will open an office in San Francisco as a consulting petroleum engineer.

C. C. CONCANNON, chief of the Chemical Division of the Department of Commerce, returned on the S. S. "America" Nov. 10, having been abroad 6 months.

OCTAVIO S. CORDOVA, sugar chemist, is now connected with the chemical department of the Lower Bafourche Refinery, Lockport, La.

C. P. DEVINE, of the J. P. Devine Co., Buffalo, N. Y., has returned from a trip to England and France. He purchased for his company the sole manufacturing rights for the United States for the Vickers-Petters semi-Diesel engine.

ALEXANDER C. FERGUSON, JR., has been elected president of the Philadelphia Chemical Club for the ensuing year, succeeding John H. Stutt, Jr. Other officers elected were: F. S. HAVENS, vice-president; C. F. WOLTERS, JR., secretary, and W. F. DONAHUE, treasurer.

SIDNEY HULL, who was blinded on April 24 by an explosion in the laboratory of the Hawthorne plant of the Western Electric Co. at Chicago, has recently been in New York City undergoing a special surgical operation for the recovery of his sight. It is hoped that Mr. Hull will resume his duties at the Western Electric Co. within the next few months.

ARTHUR D. LITTLE, president of Arthur D. Little, Inc., Cambridge, Mass., was elected life member of the corporation of the Massachusetts Institute of Technology at the fall meeting of the corporation, held on Oct. 24.

L. P. MOORE of Brooklyn, N. Y., has been elected president of the Paint Manufacturers' Association.

T. HOLLAND NELSON, formerly steel works manager with Henry Disston & Sons, Inc., and later in charge of its metallurgical research, is resigning this position to take charge of the Titusville (Pa.) works of the Cyclops Steel Co. Mr. Nelson is a native of Sheffield, England, was educated at the Sheffield University and was for several years employed by Thomas Firth & Sons, Ltd., of Sheffield, finally becoming assistant to Harry Brearlet, the eminent British metallurgist and inventor of stainless steel. Mr. Nelson came to the United States in 1911 and joined the Simonds Manufacturing Co., later transferring to Henry Disston & Sons. He returned to England at the outset of war and enlisted in the British army, but was detailed to the manufacture of munitions. He was connected with the firm of Peter Stubs, Ltd., one of the oldest tool steel houses in England, and left that company as managing director in 1920, to return to the United States. Mr. Nelson's whole life work has been in the manufacture of high-grade tool steels.

J. WARD POCHE has become connected with the Texas Sugar Refining Co., Texas City, Tex., and will supervise work in connection with the new local refinery now in course of construction.

STANLEY A. RICHARDSON has returned to the faculty of the department of engineering at Lewis Institute, and has resumed charge of the courses in metallography and ferrous metallurgy.

DR. R. E. RINDFUSZ, formerly secretary and technical director of the American Writing Paper Co., Holyoke, Mass., has recently been appointed executive secretary of the Periodical Publishers Association of America, with office in New York City.

DR. C. L. A. SCHMIDT, professor of biochemistry at the University of California, addressed the California Section of the American Chemical Society at San Francisco, Nov. 2, on the electrolytic separation of amino acids. Prof. G. O. Burr also spoke on the chemistry of humins.

VIRGIL SCHORY, chemist and assistant superintendent at the Tiffin (Ohio) plant of the Standard Sanitary Manufacturing Co., has been appointed superintendent of the Kokomo (Ind.) pottery of the company.

CHARLES W. SEIBERLING, vice-president of the Seiberling Rubber Co., Barberton, Ohio, has been elected president of the Barberton Chamber of Commerce.

T. E. SWIGART, superintendent of the Petroleum Experiment Station at Bartlesville, Okla., has been granted a furlough to go to India to assist one of the largest companies there in solving some serious operating problems.

A. P. SWOYER, which has been connected with the brass and copper industry since 1884, has been elected president of the newly organized Swoyer Brass & Copper Co., Woolworth Bldg., New York.

J. S. VANICK, who has been stationed at the Bureau of Standards as metallurgist of the Fixed Nitrogen Research Laboratory, has resigned from the government service to become a metallurgist in the new research laboratory of the International Nickel Co. at Bayonne, N. J.

Obituary

FRANK H. ANSON, founder and president of the Abitibi Power & Paper Co., died Nov. 1, at the Montreal General Hospital.

WILLIAM BURGESS, general manager of the West End Pottery Co., East Liverpool, Ohio, died Nov. 7, from a stroke of apoplexy, while at work at the plant. He was 84 years of age and is said to have been the first producer of bone china in eastern Ohio. He established a pottery in that section in 1880.

J. E. STEAD died at Redcar, Yorkshire, England, on Oct. 31. Mr. Stead was a brother of the noted journalist, W. T. Stead, and was the acknowledged British authority on the manufacture and metallurgy of steel, and famous as a metallurgical chemist. He was the recipient of numerous scientific degrees and for a time president of the Iron and Steel Institute. Mr. Stead was born in 1851.

News of the Industry

Summary of the Week

Chlorate of potash and logwood extract discussed at hearings before Tariff Commission.

France reported to be in market for American coal-tar intermediates.

September production of methanol and acetate of lime increased over August totals.

German chemists working to develop new outlets for coal-tar products.

Prussiate of soda under strong selling pressure declines to new low levels.

Final brief filed by government Nov. 13 in its case against the Chemical Foundation.

American Electrochemical Society adopts fixed time for meetings every year.

Helium's use in commercial aviation furthered by recent advances in technology of production and use.

Colloid mills to be manufactured by company in this country.

Electrochemical industry's future underlies immense power development in Northwest.

Chlorate of Potash and Logwood Extract in Hearings Before Tariff Commission

Influence of Imported Offerings Emphasized at Hearings—Domestic Chlorate of Potash Plants Closed—Production Costs of Logwood Extract Are Compared

THE charge, voiced on various occasions, that until comparatively recently there existed an international combination of potash producers by which world trade was divided and competition eliminated was reiterated before the Tariff Commission Nov. 14 in the hearing by that body on applications for changes in the duty on potassium chlorate.

Three applications affecting this chemical were filed with the commission under the terms of the flexible tariff. The Diamond Match Co. applied for a decrease in the 1½ cent per lb. duty, while the National Electrolytic Co., Niagara Falls, and the North American Chemical Co., Bay City, Mich., in separate applications asked an increase. Both the domestic plants have been shut down some months because of foreign competition.

Low Prices Close Domestic Plants

H. W. Kellogg, general manager of the National Electrolytic Co., testified before the commission that his company finds it impossible to operate at the present market price, 7¼ cents being the New York selling price of agents of importers. He asserted the opinion that an increase of three-fourths of a cent per pound in the duty would make it possible for his plant to compete. M. L. Davies, director of the North American Chemical Co., gave similar testimony.

W. A. Becker, vice-president of the Uniform Chemical Products, Inc., a subsidiary of the Diamond Match Co., who represented the latter at the hearing, did not testify in support of the application for a decrease in the duty. Mr. Becker also did not directly oppose an increase in the duty, contenting himself with the observation that unless the commission was convinced that the domestic chlorate plants could operate with the increased duty the increase should be denied.

Match Makers Oppose Higher Duty

Fred Fear, chairman of the executive board of the Federal Match Corporation, formed early in 1923 by a merger of nine independent match factories, testified that match producers could not stand an increase in costs, as competition with Canada is severe and increasing. Mr. Fear told the commission that domestic match manufacturers had been treated in an "arbitrary" manner by domestic producers of potassium chlorate. He likewise testified that for a number of years, and until the World War, it was impossible for match manufacturers to purchase chlorate abroad, as foreign producers refused to sell to them. Mr. Becker added some testimony tending to show that at one time a combination had existed by which imports could not be brought into the United States.

Mr. Kellogg and Mr. Davies both testified that if any combination had existed they had no knowledge of it and their companies were not participants in it. Mr. Davies testified that the North American Chemical Co. is a subsidiary of the United Alkali Co. of Great Britain. In addition to his connection with the Bay City company, Mr. Davies is president of the Standard Chemical Co. of Toronto and one of the outstanding figures in the Canadian chemical industry.

Agents of the Tariff Commission reported that manufacturing costs of potassium chlorate were denied them by foreign producers. They testified that imports have increased steadily under the 1922 tariff act, although this act increased the duty from ½ cent to 1½ cents per pound. Domestic production has ceased. Imports in the first 6 months of 1923 were reported as 6,807,085 lb., which is greater than the total for any entire year previously and if continued at the same rate will be sufficient to supply the entire demand in the United States.

Foreign Cost Figures Refused

Information compiled by representatives of the Tariff Commission was introduced and among other things stated that the only important producer of potassium chlorate in Germany is the Chemische Fabrik Griesheim-Elektron, with plant at Bitterfeld and main offices at Frankfurt. This company refused to reveal its costs of production of potassium chlorate to the commission. General information as to percentage of total cost made up by various cost items, and the price of the raw material, potassium chloride, was obtained; so that an estimate of costs may be made.

The commission obtained an estimate of the cost of producing potassium chlorate in Sweden. This estimate, how-

ever, was not checked to any cost records.

Potassium chlorate is produced in France by two companies—namely, Compagnie de Produits Chimiques et Electrométallurgiques, Alais, and Société d'Electro-Chimie et d'Electro-Métallurgie. The plant of the latter company, however, is located in Switzerland. Both companies refused to submit their cost of production to the commission.

Although actual production costs were not obtained for any foreign producer, the information obtained by the commission tends to show that costs in Europe are considerably lower than the costs of producing potassium chlorate in the United States.

Logwood Extract Hearing

Hearing of the application of the American Dyewood Co. for an increase in the 15 per cent duty on logwood extract under the provisions of the flexible tariff was conducted by the Tariff Commission Nov. 12.

DeWitt Clinton Jones, president of the applicant company, appeared as a witness in its behalf. Opposition to the proposed increase was entered by the Logwood Manufacturing Corporation, representing Haitian producers of the extract, which was represented at the hearing by Thomas M. Lane, of the New York law firm of Curie, Maxwell & Lane, and by J. Crooks, an officer of the corporation, who was a witness before the commission.

Mr. Jones testified that costs of production of logwood extract in Haiti and the Dominican Republic are greatly below similar costs in the United States, because of the labor element alone. He asked that American valuation be ordered for imports of the extract, which would have the result of about doubling the effective rate of customs duty. Mr. Crooks testified that while labor is cheaper in Haiti, other costs of production are higher than in the United States and that under the present method of assessing duty the Haitian producers would be driven out of the United States market, where practically all of their product is sold, if the rate were increased.

Since the application was filed, the Treasury Department last spring changed the basis of assessing duty on imports of logwood extract from the West Indies from foreign value to United States value, which had the effect of increasing the duty. This was done because there is no market in the islands and the foreign market value was an arbitrary and fictitious figure.

Agents of the commission reported that at present, under this basis of assessment, Haitian logwood extract costs 7.728 cents per pound to produce and lay down, duty paid, in New York, while the domestic cost of production is 7.882 cents per pound.

Paving Way to Nitrogen Fixation

The possibilities of the electrochemical industry, more especially nitrogen fixation, are said to make possible a great power project on the Columbia River which calls for an ultimate expenditure of $41,000,000.

The project involves the construction of a dam 2½ miles long. In the spillway sector of the dam there are to be 127 gates, each 30 ft. long, with a capacity sufficient to discharge a flood of 1,200,000 cu.ft. per second, or more than five times the flow of the Niagara River. Six 40,000-kva. and two 29,000-kva. turbo-generators will comprise the initial installation. Machinery will be installed eventually, however, sufficient to provide for the generation of 748,000 hp.

In its application to the Federal Power Commission for a license to cover its development, to be at Priest Rapids, the Washington Irrigation and Development Co. makes the significant statement that construction work will start immediately on receipt of the same.

News in Brief

The Nobel prize in physics goes this year to Dr. Robert A. Millikan for outstanding work in the microscopic universe. Dr. Millikan's contribution to the field of pure science in partly untangling the mysteries of the ion is considered great. His late experiments have indicated that radio-activity is a thoroughly general property of matter.

The Swedish Acadamy of Engineering Science has awarded its gold medal to the engineers, MM. Holmstroem and Malmberg, the inventors of a contrivance called a carbometer, by means of which it is claimed to be possible to tell at any moment in the manufacture of steel the exact carbon percentage in the mass of metal.

A paint and varnish section in the American Chemical Society is sought by about one hundred chemists associated with these trades. W. T. Pearce, head of the school of chemistry of the North Dakota Agricultural College, has presented a petition to the council of the society. It is thought that the Washington meeting of the society next spring may see this section organized.

A dye and pharmaceutical industry may be established in Kingston, Ont., if the citizens of that town vote in the December elections to allow an English company to use a waterfront site for such a purpose. Dr. F. G. Atack is head of the company about to be incorporated and it is estimated that there will be about $2,000,000 of capital behind the venture.

The consumption of gas in the British Isles during the calendar year 1922 was 265,000,000,000 cu.ft. This is an increase over 1917 of 33,000,000,000 cu.ft. During the 10-year period ended with 1922, the consumption of gas increased 60,000,000,000 cu.ft. as compared with the preceding 10-year period.

The Baldwin Canadian Steel Corp., a subsidiary company of the British Baldwin Co., of which the present British Premier is the head, may reopen its plant at Ashbridge's Bay early next year. Directors of the parent firm are in Canada now and the question is being seriously considered.

Early Reservations Urgent at Washington A.C.S. Meeting

Washington convention plans for the spring meeting of the A.C.S. reveal the very great urgency of early hotel arrangements. The meeting beginning on April 21 comes during the week following Easter, at which time Washington is often flooded with visitors who come in large parties for sightseeing. All members of the A.C.S. who think it likely that they will be in Washington are urged to communicate their hotel needs either to the hotel which they prefer or to the chairman of the hotels committee, Dr. H. C. Fuller, Institute of Industrial Research, Washington.

Explosion Rocks Indigo Plant

A 3-ton kettle reported to have contained caustic acid exploded in the indigo plant of the National Aniline & Chemical Co.'s plant at Abott Road and Lee St., Brooklyn, N. Y., on the afternoon of Nov. 9, killing three men. It is said that the kettle was suspended 15 ft. in the air and that the three men were underneath at the time.

Plant firemen were unable to cope with the flames which followed the explosion. The city fire department was called, but when water lines were directed on the flames, a second explosion occurred, injuring sixteen firemen, one policeman and nine plant employees.

The firemen then went after the flames with chemicals and soon had the blaze under control. The flames were confined to the indigo plant and damage is estimated at $15,000. Cause of the explosion has not been determined.

Metallurgical Institute Opened in India

According to a commerce report from India based on an abstract from the *Indian Review*, the opening of the Metallurgical Institute at Jamshedpur is a significant step in India's industrial development. It is financed mainly by the Tata Iron & Steel Co. The government of Behar and Orissa has decided to contribute 100,000 rupees outright, and to make an annual grant of 25,000 rupees, on condition that one-third of the vacancies are reserved for young men of those provinces. The students receive a monthly salary of 60 rupees ($20) while under training and are promised employment afterward at an initial salary of 200 rupees.

Washington News

Cotton States Want Calcium Arsenate on Free List

J. J. Brown, Commissioner of Agriculture for Georgia, has enlisted the aid of Senators and Congressmen of the Southern states which are producers of cotton, to secure a change in the tariff schedule whereby calcium arsenate may be placed on the free list. The attempt to secure a change in the tariff listing of this poison is coincident with a report from Washington to the effect that crop correspondents of the Department of Agriculture have reported that about 10 per cent of the Southern cotton acreage was treated with arsenate this year.

France in Market for American Intermediates

France is understood to be in the market for American intermediates. This is thought to indicate a desire on the part of the French to continue the production of dyes at the German plants which were taken over, without attempting the more difficult process of making the intermediates. It is believed entirely possible that France does not have enough trained men to undertake the manufacture of intermediates at these plants. Because of the moral influence that would be exerted by the production of dyes at these plants, it is believed that the French would be willing to operate the plants without profit, which probably would be necessary were they to rely upon the United States to furnish the intermediates.

Acetate of Lime and Methanol Output Larger Than in 1922

The Department of Commerce announces the September production, shipments and stocks of acetate of lime and methanol based on reports received from manufacturers. The following table gives for September the operations of wood-chemical plants, with comparisons for previous months:

	Acetate of Lime (in Lb.)			Methanol (in Gal.)		
	Production	Shipments (or Use)	Stocks, End of Month	Production	Shipments (or Use)	Stocks, End of Month
1922						
January	8,548,314	9,113,578	57,281,460	494,981	307,293	3,033,460
February	8,841,406	8,337,090	57,843,236	483,439	316,091	3,178,484
March	10,462,128	10,949,385	57,296,877	569,450	514,982	3,278,495
April	8,141,593	11,873,250	52,464,416	450,529	547,380	3,194,568
May	8,400,243	14,227,764	46,221,838	458,739	534,968	3,115,562
June	8,591,572	16,176,544	36,824,416	484,822	536,366	3,047,116
July	9,670,504	17,817,323	28,839,858	510,489	594,809	2,962,948
August	9,459,098	13,678,578	22,168,318	506,930	663,328	2,786,703
September	9,571,953	12,627,053	18,538,318	521,782	1,017,744	2,270,427
October	11,998,276	11,914,056	18,495,325	640,266	791,990	2,109,151
November	*14,886,260	15,169,774	18,236,795	*795,879	902,258	2,003,229
December	*15,922,819	19,533,670	15,282,629	*882,142	894,347	2,002,354
1923						
January	*15,478,065	15,902,722	13,956,750	*888,608	858,601	1,998,704
February	*13,194,735	13,516,829	14,096,691	*726,037	667,929	2,038,541
March	14,732,054	16,154,320	12,462,529	786,774	683,509	2,125,277
April	13,237,584	14,461,803	11,496,561	710,987	684,261	2,184,312
May	14,667,584	17,019,601	8,914,913	796,481	566,870	2,417,252
June	14,129,529	13,642,293	9,523,775	727,458	629,250	2,510,240
July	12,873,572	13,046,991	9,327,398	645,673	514,279	2,646,440
August	12,815,237	7,723,885	14,038,795	649,063	471,967	2,846,197
September	11,541,468	8,167,900	17,374,955	568,091	526,623	2,876,048

* Revised.

Germans Developing New Uses for Coal-Tar Intermediates

Recognizing that other nations now have established dye industries which are sufficiently well intrenched to resist German competition within their respective boundaries and which are even in a position to challenge much of their foreign trade, the German chemical industry is understood to be concentrating its efforts on nitrogen and other fertilizer materials. Intensive studies now are being made on other uses to which intermediates may be put. Much attention is being given to the possibilities of the cellulose industry. Instead of concentrating research on coal-tar products, as has been the case in the past, the new German policy is said to contemplate other bold ventures into the organic field, which is generally recognized as being in the infancy of its development. In that connection, attention is called to the fact that the critical situation which has surrounded the dye industry has tended to exaggerate its relative importance. Important as it is, there are many other chemical industries the value of the production of which exceeds their output very greatly.

Russian Chemical Production Gains in Volume

A report from Moscow states that according to statistics published by the Supreme People's Economic Council, the state chemical industry in the past economic year 1922-23 produced 4,857,100 poods of chemical acids (30 per cent of the pre-war production), against 3,221,600 poods in 1921-22. The industry also manufactured 4,940,800 poods of alkaline salts (90 per cent of the pre-war production), especially soda products, against 2,819,200 poods in the preceding year. Compared with the preceding year, the production of chloride of zinc, bleaching soda and other chloride products has almost doubled during the last year. The production of superphosphate amounted to 410,000 poods, against 261,000 in the preceding year. The total value of last year's production is stated to be 14,260,000 gold rubles, against 9,073,000 gold rubles in the economic year 1921-22.

Nitrate Freights Under Attack

Proposals by the railroads to cancel the present domestic rates on nitrate of soda from New Orleans to destinations in Central Freight Association territory have been attacked by Armour & Co. and Swift & Co. Those firms contend that the present domestic rates should be maintained and see in the effort of the railroads an attempt to remove another yardstick by which the import rate may be measured.

Arsenic Supply of Turkey

A report from Consul-General Ravndal at Constantinople says that arsenic exists at several points in the Province of Smyrna, and also at Zara, in the Province of Sivas, Turkey. Prospects have been opened in other parts. The chief source at present is that of the Balia lead mines, the arsenic ore production of which has reached a maximum of 262 tons in a year.

Owing to untoward political events, the Balia Karaidin Mines have not produced any arsenic since October, 1922, but expect to in the present month. They export their ore from the little port of Ak-Tchai, in the Gulf of Edremid. Their 1921-22 output of arsenic ore amounted to 200 tons, which was exported to Belgium.

Chemical Industries Show Gain in Employment

Labor statistics reveal slightly increased activity in the chemical industries during the month of October. Although the net figures for all industries compiled by the United States Department of Labor for the month indicate that employment has fallen off 0.18 per cent, in the chemical and allied industries there has been an increase of 1.4 per cent. The slight decrease noted is accounted for largely by the closing down of several large New England textile mills.

In discussing the results of the survey the report states:

"One of the encouraging disclosures is the increase over September in the number of major industries of the fourteen groups reported upon, which added to the number of employees engaged during October. Of the fourteen basic industries eight increased employment, against only five in September, as follows:

"Food and kindred products, by 4.73 per cent; tobacco manufacture, 1.5 per cent; chemicals and allied products, 1.4 per cent; lumber and its manufacture, 0.1 per cent; miscellaneous industries, 0.36 per cent; paper and printing, 0.3 per cent; iron and steel and their products, 0.3 per cent, and leather and its finished products, 0.03 per cent."

Chemical Imports for First 9 Months of Year Show 40 Per Cent Increase

Fertilizer Materials Lead in Increase—Creosote Oil Prominent in Imports of Coal-Tar Products—Paints and Pigments Below 1922 Totals

NOT only did the exports of chemicals and allied products from the United States for the 9 months of 1923 record a big gain, but also the imports, when an approximate increase of 40 per cent was made. The imports for the third quarter of 1923, however, did not reflect such a large increase as did those of the previous quarters, imports for the third quarter having an aggregate value of $45,365,963, and those for the three quarters, $164,687,981.

Fertilizers Showed Large Gain

In the classes included under chemicals and allied products, fertilizers and fertilizer materials showed the biggest increase (64 per cent in value and 46 per cent in quantity), having risen from $29,837,363 (960,620 tons) in the January-September, 1922, period, to $49,182,052 (1,391,876 tons) in the January-September, 1923, period. Receipts during the past quarter, although below those for the other two quarters of 1923, exceeded those for the third quarter of 1922.

More than double the quantity of nitrogenous fertilizers came into this country during the 9 months of 1923 than in the corresponding period of 1922, the totals for 1923 having been $39,173,582 (838,112 tons). Sodium nitrate, the most important of this kind of fertilizer, amounted to $34,023,590 (713,986 tons).

Phosphates to the value of $1 263,635 (48,754 tons) were received in the January-September, 1923, period. In contrast to the advance in the other kinds of fertilizers, imports of potash fertilzers dropped from $9,569,116 (489,574 tons) in January-September, 1922, to $8,071,075 (480,523 tons) in January-September, 1923, although the receipts during the past quarter were higher than the previous quarter.

Gums, Resins and Balsams Active

The large importations of gums, resins and balsams during the 9 months of 1923, when a gain of 55 per cent over the corresponding period of 1922 was made, were another indication of the increased consumption. In the first 3 months of 1923 the total receipts of gums, resins and balsams aggregated $13,949,774, against $7,128,893 in the first 3 months of 1922; in the second quarter, $13,374,146, against $9,377,135; the third quarter, $8,120,597, against $6,354,206; and the total for the three quarters, $35,447,066, against $22,859,934.

The imports of copal, damar and kauri gums in the 9 months of 1923 dropped 10 per cent from the 9 months of 1922, to $2,986,566 (16,602,758 lb.). In the last quarter receipts to the amount of $852,533, although in excess of the first quarter, were below the second quarter.

The imports of shellac advanced 63 per cent, from $11,496,212 (18,952,824 lb.) in January-September, 1922, to $15,746,748 (30,491,315 lb.) in January-September, 1923. Receipts in the third quarter of 1923 were the smallest of the year. Nearly double the amounts of gum arabic entered the United States in the first 9 months of 1923 than in the corresponding period of 1922, $1,207,058 (9,538,520 lb.) being received.

Pigments, Paints and Varnishes

A reduction of 10 per cent was made in the imports of pigments, paints and varnishes in the first 9 months of 1923, when $2,485,642 was received, against $2,735,905 in the corresponding period of 1922. Receipts in September, 1923, showed a loss of 42 per cent from the preceding September. Less amounts of all the commodities of this group came in during the periods under discussion. The imports of the items for the January-September, 1923, period were: ochers and sienna, 18,232,698 lb., valued at $301,639; other mineral earth pigments, 56,748,412 lb., $760,386; zinc pigments, 15,117,486 lb., $662,677; other chemical pigments, $396,536; paints, stains and enamels, 745,737 lb., $299,881, and varnishes, 17,268 lb., $65,523.

Of the oils that are important in the paint industry, linseed oil importations decreased 60 per cent in value, from $10,618,629 in the first 9 months of 1922 to $4,159,591 in the corresponding period of 1923, and 69 per cent in quantity, from 140,550,592 lb. to 42,536,289 lb., while china wood oil increased 83 per cent in value, from $5,950,839 to $10,886,818, and 21 per cent in quantity, from 8,017,235 gal. to 9,760,990 gal. The past quarter in particular has been notable for the high value of the china wood oil received ($5,302,757, 3,893,499 gal.)

Coal-Tar and Industrial Chemicals

Larger amounts of coal-tar chemicals entered the United States in January-September, 1923, when $12,093 867 worth came in, than in January-September, 1922, when $8,141,299 worth arrived. More than half of these coal-tar chemical imports were of dead or creosote oil, 45,865,138 gal., valued at $6,974,051. Notable decreases occurred in receipts of alizarin and its derivatives, indigo, and colors, dyes, stains and color acids and color bases, and in coal-tar medicinals.

The imports of acids for the 9 months of 1923 were: arsenious acid or white arsenic, 15,375,384 lb., $1,434,742; citric acid, 692,047 lb., $213,477; formic acid, 1,001,747 lb. $72,599; oxalic acid, 2,071,765 lb., $166,035; sulphuric acid, 19,304,973 lb., $162,095; tartaric acid, 1,512,644 lb., $376,079; and all other acids, free $1,395,554 lb., $15,166; dutiable, 1,628,813 lb., $235,208.

Smaller amounts of ammonium chloride were received in 1923 than in 1922. Figures for the January-September, 1923, period were 4,596,638 lb., valued at $247,233. Receipts of arsenic sulphide dropped from $403,006 (6,583,132 lb.) in January-September, 1922, to $255,413 (2,092,994 lb.) in January-September, 1923.

Large decreases were also made in bleaching powder, lime citrate, crude iodine, potassium cyanide and potassium bitartrate, crude argols or wine lees, while glycerine and sodium cyanide nearly doubled.

Jewelers Want Fineness Standard for Platinum

A renewed effort is being made by the National Retail Jewelers Association looking to the standardization of platinum. If a standard carat should be adopted, the fineness of the metal then could be shown as parts of the unalloyed product as is the case with gold, representatives of the association point out. It is stated by the jewelers that much platinum of very low fineness now is being put on the market. The buying public should be protected, they claim.

Chemists are dependent on platinum as the essential material for their resistance utensils. They realize that with Russion production under suspension for an indefinite period, the point will be reached in the near future where the price of the metal will work as a much greater handicap than is the case at present. Under existing conditions the only thing which acts as a deterrent against the purchase of platinum jewelry is the very fact that the public knows much jewelry purported to be platinum contains only a small quantity of that metal.

The mere fact that standardization would mean very high prices for platinum of high fineness would not curtail the demand, chemists believe. In fact they believe it would stimulate demand, since the psychology that seems to control jewelry purchases favors the sale of the higher priced articles. Moreover, chemists tend to the opinion that the taste for platinum is an artificial one, since womankind, as well as mankind, since the early ages has shown a strong preference for gold jewelry.

Ceramic Industry Goes to Ontario

The Bush English China Co., which recently obtained a Dominion Government charter, has obtained a 99-year lease on buildings and land with deep-water docks and railway siding at Port Hope, Ont. The company will manufacture china table ware, and will import from England clays of the same grades that are used in the English factories. Up to now no china table ware has been made in Canada, the great bulk of that which is used being imported from England.

Sugar Mill Solves Labor Problem by Employing Mexicans

The Great Western Sugar Co., Denver, Colo., is bringing in a large number of Mexican workers for employment at its beet sugar mills, selecting experienced men and offering inducements for permanent occupation. Colonies have been established in six of the localities in which the company operates plants, with an allotment of ample sites for housing. The plan covers the providing of land by the company, with the workers agreeing, in turn, to construct a house of two or more rooms and establish a permanent residence on the site for a period of 5 years. It is said that the results up to the present time are encouraging and show a real solution of the labor problem. By colonizing the Mexicans in this manner, the company has available experienced resident laborers a all times, with the consequent elimination of transportation expense necessary to secure men.

Sicilian Sumac of Poorer Quality

The present Sicilian sumac crop, August-September, 1923, is estimated to be about 20,000 tons, and while it is abundant, the quality is not as good as last year's, because of the unusually few rainy days during this season. Consul Edward I. Nathan at Palermo in a report on this commodity says that stocks of the previous crop are entirely exhausted, and in consequence prices are above normal. There is practically no demand from England on account of inactivity in the British tanning industry, neither is there any demand from United States importers, who are awaiting a drop in prices. Present prices c.i.f. New York range from $72 to $76 per ton, 28 per cent ground sumac.

Colloid Mill Company Formed

Research and commercial development work on the Premier colloid mill, colloid processes and colloid products is planned by the Premier Mill Corporation of Geneva, N. Y. This company is the American branch of the British company of the same name. The officers are: B. M. Nester, president; S. K. Nester, treasurer; G. M. B. Hawley, general manager, and S. F. Acree, research director.

California Oil May Go to German Refineries

Part of the excess production of Californian petroleum, the problem of the storage of which is taxing the ingenuity and resources of producers to the utmost, may go to Germany. An investigation of the Western product is being made by Julius Schindler, Dr. S. Schwabacher and Dr. Otto Kulka. If tests are satisfactory and if arrangements of mutual advantage can be made, the German refineries henceforth will use California instead of Texas petroleum.

Helium's Use in Aircraft Made More Feasible

Production Methods Improved — Difficulties of Conservation Overcome —Outlook Considered Good

A great stride forward in the manufacture of helium has resulted, it is believed, from the process worked out in the Cryogenic Laboratory of the Bureau of Mines. Since Sept. 15 this process has been applied on a semi-commercial scale to the manufacture of the gas and 95 per cent helium has been produced at one operation. The results are said to check with the fundamental data and with the data secured during the laboratory work.

The plant was designed by the Board of Helium Engineers, of which M. H. Roberts, of the Franklin Railway Supply Co., is chairman. The Bureau of Aeronautics of the Navy, the Army Air Service and the Bureau of Mines each has contributed importantly to the success of the plan.

While no figures are being given out at present, it is known that the costs of production are very satisfactory. The plan also lends itself to the erection of small units at various points where helium-bearing gas may be available.

Because of its bearing on the conservation of helium, chemists will be interested in the following statement issued by the Bureau of Standards:

The Bureau's Announcement

The U. S. Bureau of Standards, in co-operation with the Army Air Service, has devised a condenser, or water ballast recovering apparatus, for retrieving moisture in the exhaust gases from the engine and thus rendering it unnecessary to valve helium, the non-flammable but scarce and costly gas with which the huge navy airship "Shenandoah" is now inflated.

To maintain the equilibrium of an airship inflated with either helium or hydrogen gas, it is necessary at times to "valve," or, in other words, permit some of the gas to escape in order to compensate for the weight of fuel consumed by the engines, or to overcome the expansion of the gas caused by the heat of the sun's rays.

How to compensate for the weight of fuel lost and also to maintain the lifting gas at an even temperature so as to conserve helium, which in future is destined to supplant hydrogen gas in lighter-than-air craft, presented a difficult problem for government engineers. As early as 1915 the British Government made some efforts in the direction of the recovery of the water vapor component formed as a product of combustion from the exhaust gases from the engine, but the results achieved were not of sufficient promise to warrant the continuation of tests. Some time prior to 1920 a type of water recovery apparatus had also been experimented with at the Washington Navy Yard.

The information gained through these experiments proved of value when work began on the project for the Army Air Service. While the experiments were financed and sponsored by the Army Air Service, it was the scientists at the Bureau of Standards who worked out a practical solution of the problem and developed a successful device.

The condenser consists of a series of long slender pipes or tubes, 0.022 in. in wall thickness and 1 in. in diameter, comprising about 300 ft., through the inside of which gas is conducted on its way from the exhaust manifolds of the engine to the atmosphere. The air, sweeping over the outside of the pipes as the airship is in motion, cools the gases, and the condensed water vapor is drawn off from a separator through appropriately located drains. The weight of this water is approximately the same as the fuel consumed. It has long been known that for every pound of fuel economically consumed there is available in the exhaust gases more than the same weight of water vapor.

The apparatus, which of necessity had to be built as light as possible in order to permit its use on airships, weighs only about 450 lb. complete, is made of aluminum and aluminum alloys and is sufficient to take care of the exhaust from two 150-hp. engines. The efficiency of the apparatus was evidenced by the recent successful trial flights of the army airship D-3 at Langley Field, Va., and the Aberdeen Proving Grounds, Md., and it is quite likely that same will be installed eventually on all service airships.

Having solved the problem of compensating for the weight of fuel consumed, there remains only that of maintaining the desired temperature of the lifting gas. Work is already in progress along this line, and many preliminary data are available.

May Build Blast Furnace on Puget Sound

Anticipating future demands, when Oriental and domestic steel requirements will overtax present plant facilities, surveys have been started with a view of eventually erecting on Puget Sound an immense blast furnace to entail an expenditure of approximately $500,000. This was announced recently by officers of the Pacific Coast Steel Co., one of Seattle's biggest industries.

Washington coals are excellent for coke, and all that is needed for successful operation of a blast furnace for the manufacture of pig iron is assurance of a steady supply of iron ore, it was explained. Surveys are being made in British Columbia and Alaska.

Washington A.C.S. Elects

The Chemical Society of Washington on Nov. 8 selected the officers who will be in charge of local chemical affairs during the coming year, in which period this section entertains the American Chemical Society. The newly elected officers are: President, R. S. McBride, assistant editor, *Chem. & Met.;* secretary, J. B. Reed, Bureau of Chemistry; treasurer, H. W. Houghton, Hygienic Laboratory. Counselors from the section are to be R. B. Sossman, W. Mansfield Clark, Atherton Seidell and W. W. Skinner. The remaining members of the local executive committee will be L. H. Adams, William Blum, D. K. Chestnut, C. S. Lind, F. W. Smither and E. T. Wherry.

Final Brief Is Filed in Foundation Suit

Government Defends Americanism of Metz—Holds Trial Not Aimed at Wilson's Administration

In filing its final brief in the trial of the Chemical Foundation the government has made the last move necessary before Judge Morris hands down his decision in the case. The brief placed on file by Attorney-General Daugherty on Nov. 13 disclaims any desire to enter into any other discussion than that hinging upon the law involved. It contends that throughout the trial of the case, which opened on June 4 and ended late in July, the defendant endeavored to create the impression that the proceedings were brought by personal direction of the President of the United States and "was a personal or political attack upon the former President and certain other former officers of the government." Beyond denying that this point is worthy of argument the government states that:

"In order to remove any possible doubt upon the subject, we now desire to repeat what was so often said during the trial and argument, that nothing said or done in this suit was or is intended as a criticism of the good faith and motives of the former President or of Mr. Polk."

The government's brief refers to the attack made upon Herman Metz, former Comptroller of New York and a leading witness for the government. The brief defended Mr. Metz's Americanism and character. Continuing, the brief sets forth:

"The intemperateness and unfairness of those attacks upon men who have no opportunity to reply should be sufficient to destroy any possible effect which the discussion of their evidence might otherwise produce."

It is further claimed that no effort is made in the brief to reply to the arguments of the Foundation concerning the alleged harm done by the Germans and that "the condition of the dye and chemical industry or the benefits which would accrue thereto by virtue of these transactions if sustained" is beside the point. In part the brief says:

"The wrongs of the Germans have been dealt with in the forum of war. The dye and chemical industry was in a prosperous condition when these transactions took place, as shown by the report of Mr. Palmer. The government of the United States, in possession of these patents and other rights, was quite as capable of promoting the welfare and development of that industry as a private corporation could possibly be. In fact, these questions are committed to Congress by the Constitution of the United States.

"Whether these transactions would prove beneficial to the industry or not is a question with which this court, we submit, is not concerned."

American Electrochemical Society Outlines Meeting Plans

The board of directors of the American Electrochemical Society has recently taken action on several matters of general interest.

In order to make the dates of spring and fall meetings as nearly uniform as possible from year to year, it has been determined that spring meetings shall be held on the last Thursday, Friday and Saturday of April and fall meetings on the last Thursday, Friday and Saturday of September. In case the dates for the spring meeting fall in Holy Week, the meeting will be held in the week following.

With reference to the acceptance and publication of manuscripts submitted in the name of a company research staff, the board has ruled that at least one name of an individual must be attached to such a paper, and that the publication committee is empowered to obtain such a name as well as to determine the acceptability of the paper.

With reference to former members of the society who were suspended during the war on account of nationality, it has been decided that they may be reinstated without election or payment of the initiation fee upon written application to the secretary.

Larger Shipments of Sumac and Sulphur Oil From Palermo

Increased activity in the American textile and soap-making industries is reflected in larger imports of sulphur oil. During the first 6 months of 1923, according to a report to the Department of Commerce, shipments from the Palermo district to the United States have totaled 2,261,949 lb. The figures for the corresponding period of the 3 years immediately preceding are: 742,804 lb., 112,501 lb. and 393,732 lb.

Imports of sumac from the Palermo region during the first 6 months of 1923 amounted to 3,705 tons, as compared with 2,194 tons during the first 6 months of 1922, and 1,136 tons and 4,614 tons for the corresponding periods of 1921 and of 1920, respectively.

Imports of citric acid from that district during the first 6 months of 1923 were 567,800 lb., but little more than one-half the amount imported during the corresponding period of 1922. This reflects the increase in domestic production and the tendency to substitute tartaric, phosphoric and maleic acids in soft drinks. In that connection it is interesting to note that the Palermo district during the first 6 months of the current year sent 602,104 lb. of tartaric acid to the United States, whereas no shipments were recorded during the same period of 1922.

Second Power Exposition to Be in New York

Exhibits Include Much to Interest Chemical Engineer, Including Fuel Equipment and Refractories

Engineers coping with the problem of refractories in boiler furnace operation at the modern high temperatures are likely to secure much information of value at the coming Power Exposition to be held at Grand Central Palace, New York, Dec. 3 to 8. The various manufacturers of refractory material have been attempting a solution of the problem of producing an economical firebrick for this severe service. The exhibits at the Power Show will display the progress of their efforts. High-temperature insulation in brick block, powder and cement form, air-cooled blocks, clinker-proof blocks and other forms of refractory designed to reduce furnace maintenance, increase furnace efficiency and reduce labor costs will be displayed.

Pulverized fuel and fuel oil systems are under serious consideration in many plants. The equipment necessary to use these types of fuel will therefore undoubtedly attract considerable attention at the show. Fuel oil burners complete with controls and pumps will be displayed by several companies. One exhibitor will show a burner in action spraying water in a glass case. A boiler setting will also be displayed illustrating the method of bricking and connecting the burner and installing the air register.

Pulverized fuel equipment may be seen at the exposition and will be of great interest to those who have kept in touch with the recent successful installations that have given high economies and steady performance.

Illinois to Give Special Ceramic Course to Practical Men

The University of Illinois announces a short course in clay working and enameling to be given Jan. 14 to 26, 1924. The course is designed to meet the requirements of practical men. It will deal with the principles underlying the work of managers, superintendents, foremen, burners and others who may be concerned with the manufacture of ceramic products.

The course of instruction will include lectures, laboratory work and informal discussions. Besides the members of the staff of the department of ceramic engineering and members of the engineering and other faculties of the university, it is expected that R. M. Howe of the Kier Fire Brick Co., Pittsburgh, Pa., formerly of Mellon Institute; R. R. Danielson, of the U. S. Bureau of Standards, and Prof. A. S. Watts, head of the department of ceramic engineering of Ohio State University, will assist. Programs may be had upon application to the department of ceramic engineering, University of Illinois, Urbana, Ill.

Nickel Laboratory Staff Consolidated

As a part of its plan for an additional research laboratory in Bayonne, N. J., the International Nickel Co. is transferring to that laboratory several of its research workers. As previously announced, Dr. Paul D. Merica will direct the laboratory.

R. G. Waltenburg, who has been located as a research associate at the Bureau of Standards, will move to the new laboratory shortly. O'C. J. Frazer, who has been a research fellow of the International Nickel Co. at Mellon Institute, Pittsburgh, will also be transferred to the Bayonne organization. Mr. Waltenburg will continue his work on the relation of composition to properties of nickel, Monel metal and other nickel alloys. Mr. Frazer will continue his work on the corrosion problems which he has been investigating.

Financial

Net earnings of Mathieson Alkali Works, Inc., for quarter ended Sept. 30, 1923, were $272,705, after reserve for depreciation, but before federal taxes, equivalent after allowing for regular 1¾ per cent preferred dividend requirements, to $1.88 a share earned on $5,885,700 common stock. This compares with $316,467, or $2.26 a share on common in third quarter of 1922.

The Standard Oil Co. of Indiana has declared regular quarterly dividend of 62½c., payable Dec. 15 to stock of record Nov. 16.

A block of 30,000 shares of the Class B common stock of the Commercial Chemical Co. of Tennessee was offered last week at $15 a share. The stock has no par value. The company has recently increased its facilities for the manufacture of calcium arsenate.

The New Jersey Zinc Co. for the quarter ended Sept. 30 reports net income of $1,050,793, as compared with $2,077,010 for the preceding quarter and $1,732,521 for the corresponding period last year.

Devoe & Raynolds Co., for the 6 months ended June 30, showed net income of $855,528. This exceeds by $37,000 total earnings for the entire fiscal year of 1922.

The Sherwin-Williams Co. has declared an extra dividend of one-half of 1 per cent in addition to the regular quarterly dividend of 2 per cent. The annual report of the company and its subsidiaries for the year ended Aug. 31 shows a net profit of $5,559,379, compared with $3,016,805 in the previous year. The total sales for the year in the United States were $48,722,671 against $40,343,742 in the preceding year.

Suggests a New Refrigeration Insulation

At the Fourth National French Refrigeration Congress, just held at Strasbourg during the Pasteur centenary, a very optimistic report on the application of a new insulating material of possible application to refrigeration was read. The product is known as *liége Malalenca*, a product of the French colony of Indo-China.

The need thereof is daily becoming more and more necessary with the gradual thinning out of the cork oak in the Mediterranean. Apropos thereof it is stated by a French authority that had it not been for the invention of the cork disk for the sealing of bottles under the original crown cork and seal patents there would be no merchantable cork left today. The further use of this material on a large scale for the production of insulating corkboard, linoleums and the like is using vast quantities of scrap and low-grade bark which hitherto found no outlet.

The virgin cork forest of Marmora in the French protectorate of Morocco will be put into gradual exploitation within the next few years. Its extent, however, is not great, so any substitute for cork, for insulating purposes in particular, will be welcomed by the refrigeration industry, provided it gives the desired results under the rather insistent demands of the industry.

Paper Imports Concern Leaders of the Industry

Heavy importations of paper, particularly of wrapping grades, have come to exert such a pronounced effect upon domestic mills that Henry W. Stilkes, president of the American Paper and Pulp Association, has called a conference of all members to discuss the matter. Customs authorities, it is explained, refused to give relief under the anti-dumping statute. This will be discussed along with the bringing in of various types of paper under improper classification, undervaluation and other subjects.

A development regarded to be of considerable interest to the industry is the recent appointment by Secretary Wallace of twenty leading men in the pulp and paper field to form an advisory committee to co-operate with his department in its forestry program. Hugh P. Baker, secretary of the A.P.P.A., in conference with Chief Forester Greely and E. H. Clapp, director of research for the service, has been active in the formation of this committee. The list of those who have been asked by Secretary Wallace to serve on this committee follows:

George W. Sisson, Jr., president of the Raquette River Paper Co., Potsdam, N. Y.; Colonel W. E. Haskell, vice-president, International Paper Co., New York City; Stanley C. Bayless, secretary-treasurer, Bayless Manufacturing Co., Austin, Pa.; E. B. Murray, vice-president, Union Bag & Paper Corp., New York City; L. M. Alexander, president Nekoosa-Edwards Paper Co., Port Edwards, Wis.; D. C. Everest, vice-president, Marathon Paper Mills Co., Rothschild, Wis.; C. A. Gordon, vice-president, Oxford Paper Co., New York; Norman W. Wilson, vice-president, Hammermill Paper Co., Erie, Pa.; W. B. Nye, vice-president, S. D. Warren Co., Boston; George W. Ostrander, director of Finch, Pruyn & Co., Glens Falls, N. Y.; H. E. Fletcher, vice-president, Fletcher Paper Co., Alpena, Mich.; F. E. Bragg, president, Orono Pulp & Paper Co., Bangor, Me.; F. C. Clark, vice-president, Pejepscot Paper Co., Brunswick, Me.; David L. Luke, president, West Virginia Pulp & Paper Co., New York City; A. G. Goodyear, president, Bogalusa Paper Co., Buffalo; Louis Bloch, vice-president, Crown Millamette Paper Co., San Francisco; Grellet Collins, president, Dill & Collins, Philadelphia; O. Bache-Wiig, vice-president, Wausau Sulphate Fiber Co., Mosinee, Wis.; Henry W. Stokes, president, Yorkhaven Paper Co., Philadelphia, and Hugh P. Baker, executive secretary, American Pulp and Paper Association, New York.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	64½	68
Allied Chem. & Dye	64½	65⅝
Allied Chem. & Dye pfd.	107	107½
Am. Ag. Chem.	11	12⅝
Am. Ag. Chem. pfd.	30½	37¼
American Cotton Oil	5¾	6½
American Cotton Oil pfd.	18	20⅝
American Cyanamid	75½	77
Am. Drug Synd.	5⅞	5⅞
Am. Linseed Co.	17	17¾
Am. Linseed pfd.	34⅝	34¾
Am. Smelting & Refining Co.	55⅜	58½
Am. Smelting & Refining pfd.	96½	96
Archer-Daniels Mid. Co., w.i.	25	22⅞
Archer-Daniels Mid. Co. pfd.	91½	89
Atlas Powder	54	54
Casein Co. of Am.	*64	*64
Certain-Teed Products	30	35
Commercial Solvents "A"	35	*34
Corn Products	129⅝	128⅞
Corn Products pfd.	117	*119
Davison Chem.	52	57⅞
Dow Chem. Co.	48⅞	*45
Du Pont de Nemours	132½	128¼
Du Pont de Nemours db.	85	85
Freeport-Texas Sulphuric	11¼	11¼
Glidden Co.	7	6⅝
Grasselli Chem.	*132	*132
Grasselli Chem. pfd.	*145	*145
Hercules Powder	*108	*106
Hercules Powder pfd.	*104	*103
Heyden Chem.	1	1⅝
Int'l Ag. Chem. Co.	⅝	1
Int'l Ag. Chem. pfd.	5	5¼
Int'l Nickel	10⅞	11⅞
Int'l Nickel pfd.	78	80
Int'l Salt	83½	*86
Mathieson Alkali	35	35½
Merck & Co.	*70	*70
National Lead	122	*124⅞
National Lead pfd.	111½	*112
New Jersey Zinc	140	*140
Parke, Davis & Co.	78	77⅞
Pennsylvania Salt	88½	92⅞
Procter & Gamble	*134	*135
Sherwin-Williams	*32	*31
Sherwin-Williams pfd.	*100	*100
Tenn. Copper & Chem.	8¼	*9
Texas Gulf Sulphur	61	62⅝
Union Carbide	54½	55½
United Drug	76½	77¼
United Dyewood	*42½	*45
U. S. Industrial Alcohol	55½	59
U. S. Industrial Alcohol pfd.	*100	*98
Va.-Car. Chem. Co.	7⅞	8½
Va.-Car. Chem. pfd.	24⅞	25½

*Nominal. Other quotations based on last sale.

Market Conditions

Weakness in Prussiates Features Current Trading in Chemicals

Easy Price Tendency for Many Commodities—Good Movement of Alkalis—Imported Chemicals Affect Domestic Production

PRICE fluctuations are having considerable influence on the volume of trading in chemicals. In some cases lower prices have stimulated buyers to greater activity both for spot goods and for later deliveries. In other cases price declines have destroyed confidence in values and have tended to hold buying down to current requirements.

Fluctuations in values during the week favored buyers, as many selections showed an easier tendency. Prussiate of soda was the weakest item on the list and caused almost universal discussion because of the sharp break in values. At the beginning of the month this material was held at 13@13½c. per lb. according to seller, while sales were made in the past few days at 10c. per lb. Liquidation of foreign holdings and readiness of domestic producers to compete are the factors responsible for the declines. Most of the acids outside the mineral group also are easy in price and the same is true of bichromates, cyanides, bleaching powder, imported caustic potash, permanganate of potash, and formaldehyde.

Imported chemicals and allied materials not only have an important bearing on prices for domestic offerings but sometimes affect production of the latter. This was brought to attention during the week at the hearing on chlorate of potash held by the U. S. Tariff Commission. The two sole producing companies in this country testified that their plants had been closed for some months because they were unable to operate successfully in competition with the values ruling for imported selections. Domestic production of nitrite of soda also has practically come to a standstill because of alleged inability to manufacture at a profit on present price levels.

The weighted index number for the week indicates a material decline. Crude cottonseed oil fell away from the high level reached in the previous week and downward revisions in the chemical list made their influence felt in depressing the index. In many cases price changes have followed the revision of sales quotations in proportion to the position of raw materials and thus represent legitimate price readjustments, although these readjustments undoubtedly were hastened by the keenness of competition in the selling ends of the industry. In the case of prussiates and bleaching powder selling competition has reached a stage where price wars are descriptive of selling methods.

Acids

Acetic Acid—Large consumers are pretty generally covered on contracts and are taking deliveries in normal volume. New business is light and buying for export also is said to be along very moderate lines. The position of acetate of lime is unchanged and this is reflected in the acid market. Prices are quoted at \$3.38@\$3.63 per 100 lb. for 28 per cent; \$6.78@\$7.13 per 100 lb. for 56 per cent; \$9.58@\$9.83 per 100 lb. for 80 per cent; \$12@\$12.78 per 100 lb. for glacial.

Prussiate of Soda Declines Sharply — Bleaching Powder Lower for Prompt and for Contract—Liquid Chlorine Lower—Phosphoric Acid Marked Down —Domestic Copper Sulphate Higher — Arsenic Steady — Bichromates Irregular — Permanganates of Potash Easy—Denatured Alcohol Firm

Citric Acid — Based on production costs the market for domestic acid is firm, as it is difficult to see how goods can be produced under the present asking price of 49@50c. per lb. Imported acid, however, is weak, as holders of stocks are finding a poor outlet and have been granting concessions. General asking prices are 48c. to 48½c. per lb. but it is stated that 47c. per lb. could be done on firm bids.

Formic Acid—Imported grades continue to control the market. Arrivals recently were small but increased in the past week and added to the spot supply. Foreign markets have been firmer and prices quoted for spot holdings range from 12½c. per lb. and upward according to quantity and seller.

Hydrofluoric Acid—The steady position of fluorspar has a stabilizing effect on the acid market. Buying orders also have increased in volume and helped to place the market in a more favorable position. Asking prices are 6@6½c. per lb. for 30 per cent; 10@10½c. per lb. for 48 per cent; 11@11½c. per lb. for 52 per cent; and 13@13½c. per lb. for 60 per cent.

Lactic Acid—Domestic makes are moving regularly into consumption and improved buying has been reported in recent weeks. New business includes round lots as well as jobbing quantities. Prices are quoted at 4½@5c. per lb. for 22 per cent dark; 5½@6c. per lb. for 22 per cent light; 9½@10c. per lb. for 44 per cent dark; 11½@12c. per lb. for 44 per cent light.

Muriatic Acid—Stocks accumulated in the summer months have been reduced and present demand is said to be in line with production. As a result prices are firmer and there is less tendency on the part of sellers to shade quotations. Asking prices are 90c. to \$1 per 100 lb. for 18 deg.; \$1@\$1.10 per 100 lb. for 20 deg.; \$1.75@\$1.90 per 100 lb. for 22 deg.

Nitric Acid—Withdrawals against existing orders are taking large amounts from works. New business likewise is more prominent and consumption is reported to be on a fairly normal basis. Market prices vary somewhat according to seller and prices cannot be called firm but concessions are not so marked as they were earlier in the season. Prices are quoted at \$4.50@\$4.75 per 100 lb. for 36 deg.; \$4.75@\$5 per 100 lb. for 38 deg.; \$5@\$5.25 per 100 lb. for 40 deg.; and \$5.25@\$5.50 per 100 lb. for 42 deg.

Potashes

Bichromate of Potash — Relatively good demand is reported for this chemical and improvement in two of the largest consuming industries has been reflec'ed in a better buying movement. Demand is largely for prompt and nearby positions, which are quoted at 9½@9¾c. per lb. according to quantity and seller. Resale lots are not prominent in the market and most of the business is between producer and consumer.

Carbonate of Potash—The market has held a steady position under moderate buying. Calcined 80-85 per cent is quoted at 6c. per lb. and moderate sized lots are reported to have changed hands on that basis. Offerings for shipment are heard under that figure but are not numerous. Hydrated is holding at 6¾@7c. per lb. on spot. On 96-98 per cent spot quotations are 6½@6¾c. per lb. with shipments at 6¼@6½c. per lb.

Chlorate of Potash—A hearing was conducted by the Tariff Commission last Wednesday, following applications for a reduction and for increases in the prevailing duty on imported. Domestic

makers stated that their plants had been closed for several months because of the competition from foreign makers. Stocks of domestic held at works are offered at 8½c. per lb. but are receiving very little attention. Imported is quoted at 7¼@7½c. per lb. Demand continues quiet with consumers apparently covered for the present.

Caustic Potash—Imported caustic on spot was offered at 7c. per lb. and sales are said to have been made at that figure. Offerings for shipment from abroad were heard as low as 6¾c. per lb. although most sellers were quoting 6⅝c. per lb. as their inside figure.

Permanganate of Potash—Buying has been along quiet lines and holders of imported material were willing to do 17c. per lb. There was no change in the position of domestic material and quotations were repeated at 17@17½c. per lb. at works.

Sodas

Acetate of Soda—There is no life in the market for acetate of soda and prices are still featured by a willingness of sellers to grant concessions. First hands are openly quoting round lots at 5c. per lb. at works. Resale lots also are to be had at 5c. per lb. and upward on a quantity basis.

Soda Ash—There has been no let up in the distribution of soda ash to domestic consumers and a regular movement is reported against contracts. Consumption is said to show a good gain over that of last year. Export demand has not been maintained to the same degree as domestic buying and shipments to foreign markets are below the totals of last year. Prices are on a steady basis with contracts offered at $1.25 per 100 lb., in bulk, for light ash 58 per cent, at works; $1.38 per 100 lb., in bags; and $1.63 per 100 lb., in bbl. Dense ash is offered at $1.35 per 100 lb., in bulk, $1.45 per 100 lb., in bags, and $1.69 per 100 lb., in bbl. These prices are for carlots.

Bichromate of Soda—Producers are holding prices up well as far as jobbing lots are concerned and ask 7½@7⅝c. per lb. On large lots for actual consumers, however, the price is irregular and private terms have entered into sales for prompt and also for contracts covering later deliveries. Sales have been made at 7@7½c. per lb. at works for carlots and the outside price is openly quoted by some producers.

Caustic Soda—Very satisfactory business is reported from the home trade and the movement from works to consuming plants is larger than it was last year. Export trade is not so encouraging and is considerably below that of last year. Different reasons are given for the falling off in export business, but competition from foreign makers is one of the prominent reasons. Some reports have reached this market that standard brands of American make are held in foreign markets, notably in Brazil, and are offered in the spot market there, under the prices quoted for shipments by American sellers. Prices for caustic are quoted at 3.10@3.15c. per lb. for standard makes in drums, carlots at works. For export 3.10c. per lb. f.a.s. New York is asked.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	164.60
Last week	167.18
Nov., 1922	158.00
Nov., 1921	147.00
Nov., 1920	240.00
Nov., 1919	239.00
Nov., 1918	279.00

There was a sharp decline in crude cottonseed oil. This had an important influence on the week's index number, which went off 258 points.

Prussiate of Soda—Unusual interest has been drawn to this material by the irregularity of prices. Sharp declines have featured trading and sales have been made as low as 10c. per lb. in the spot market. Later in the week prices recovered and holders of spot material were asking 11¼c. per lb. Shipments were offered at 10¾c. per lb. In accounting for the break in prices it was stated that foreign material was liquidated without regard to price and some holders of domestic material met the declines as made by importers. The low prices reached caused considerable discussion regarding production costs of domestic and the opinion is held in some quarters that some domestic producers are in a position of advantage through control of low priced materials.

Miscellaneous Chemicals

Acetate of Lime—Domestic production shows a material gain in the first 9 months of the year as compared with the corresponding period of 1922. The totals are 122,669,828 lb. and 81,706,811 lb. respectively. However, production for the greater part of 1922 was restricted in order to reduce stocks, which decreased from 57,281,460 lb. at the end of Jan. to 15,282,629 lb. at the beginning of January, 1923. Stocks at the end of September were 17,374,955 lb., which is the largest amount carried at any time this year. Present consumption is reported to be good as far as domestic users are concerned, with a rather light movement for export. Prices are holding unchanged at $4 per 100 lb.

Arsenic—Call for arsenic has been less brisk and the week was comparatively quiet. Prices, however, are holding on a steady basis and spot material is holding at 14c. per lb. Spot stocks are said to be light and are in firm hands, as the market is free from selling pressure. Shipments are restricted, as some producing countries are not offering. During the week offers of European make were heard at 13½c. per lb. Domestic makers are quoting 13@14c. per lb., according to position.

Bleaching Powder—A further drop in prices was announced last week. On November and December shipments from works, the price was reduced to $1,25 per 100 lb. for carlots, f.o.b. producing point. While this was a lowering in the prices previously quoted it merely placed the quotation price in line with the trading price, as there has been no difficulty in placing orders for these deliveries at the $1.25 per 100 lb. price. In fact the present asking price is none too firm, as there are unconfirmed reports that under $1.25 per 100 lb. has been done. The contract price for 1924 deliveries also was reduced and was placed at the same level as that asked for prompt material. Liquid chlorine also came in for a cut in price and 1924 contracts were lowered to 3¼c. per lb. in tanks, f.o.b. works. This represents a decline of ½c. per lb.

Copper Sulphate—The firmer market for the metal has been reflected in the sulphate market and domestic makers have advanced their price to $5 per 100 lb. for large crystals. Demand is not active but is said to be up to seasonal standards. Imported sulphate is neglected and is easy in price with spot goods able to be picked up around 4⅛c. per lb. and shipments at the same level.

Fusel Oil — Offerings on spot have increased as a result of arrivals from abroad. Stocks are still small but buying is slow and the tone is easier. While no open reductions in asking prices were made it was stated that sellers were open to bids and that material could be bought at $4.25 per gal. for crude and possibly this could be scaled down a little.

Barium Carbonate—Domestic makers are well sold ahead and spot holdings of imported also are small. There were sales of the latter during the week at $72 per ton. On shipments from abroad $68 per ton was quoted.

Sal Ammoniac—Some imported goods sold on spot at 6¼c. per lb. but the general asking price was 6½c. per lb. and at the close the market was firm at the latter figure. Shipments from abroad were also firm at 6½c. per lb. Domestic makers quote white granular at 7¾@8c. per lb. and gray at 8@8¼c. per lb.

Alcohol

A firmer undertone featured the market for denatured alcohol and some operators went so far as to hint that an advance was under consideration. But up to the close the schedule remained unchanged, the No. 1 special, 190 proof, holding at 41½c. per gal., in drums, carload lots. Formula No. 1, completely denatured, was offered on the carload lot basis of 42½c. per gal., in drums. Ethyl spirits, 190 proof, U.S.P., held at $4.74@$4.79 per gal., in bbl. Methanol prices in several quarters were unsettled. Leading factors continued to quote 88c. per gal., in drums, on the 95 per cent material. The pure was quotably unchanged at $1 per gal., in drums. Production of methanol in September amounted to 568,091 gal., against 649,063 gal. a month previous and 521,782 gal. a year ago.

Coal-Tar Products

Pyridine Slightly Easier as Imports Increase—Sales of Phenol on Spot at 25c—Salicylates in Demand

INDICATIONS point to an easier situation in pyridine. The importations have shown a steady gain and offerings of spot material came out during the week at concessions. Not so long ago spot material actually sold at $6 per gal., while last sales were reported at $5.25. Futures were offered quite freely. Phenol continued to attract attention and business was put through at 25c. per lb., in drums, immediate delivery. Several holders, however, would not quote under 26c. per lb. Naphthalene was irregular on keen competition for 1924 business, especially in white flake.

The situation in crudes underwent little if any change, supplies being ample for current needs. Prices for benzene were unsettled, outside lots of the 90 per cent grade moving at a shade under 21c. per gal., tank car basis, f.o.b. point of production. Solvent naphtha was regarded as steady. Cresylic acid receipts from abroad were liberal and with domestic producers in a position to offer prompt material prices were little more than nominal, covering a wide range, according to specifications. Several shipments of coal-tar distillate arrived from Liverpool.

Benzyl-chloride was offered for shipment at 25c. per lb., in drums, f.o.b. works, with the refined grade at 40c. per lb., in carboys. Beta-naphthol showed no further change in price, several producers holding out for 25c. per lb. Paranitraniline was in better request and steady so far as first hands were concerned. A feature in the market was the improved call for salicylates, which steadied prices, but brought out no changes. Japan has been buying on a larger scale. Advices from Washington reported buying interest by France for intermediates.

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Aniline Oil and Salt — So far as producers were concerned, the market for aniline oil closed steady at 16c. per lb., in drums, prompt and forward shipment. Demand was routine only. On the salt nominal prices held at 23@23½c. per lb.

Benzene—With no improvement in the motor fuel situation, the market for benzene was irregular. Some traders admitted that prices were easy and that shading was possible on round lots for nearby delivery. Demand for the 90 per cent grade was described as fair. Leading factors continued to quote 21c. per gal. on the 90 per cent material, in tank cars, f.o.b. works, and 23c. per gal., on the pure, in tank cars, f.o.b. works.

Benzyl-Chloride—Production has been resumed and offerings of the technical grade were reported at 25c. per lb., in drums, f.o.b. works. On the 95@79 per cent refined the market stood at 40c. per lb., in carboys, f.ob. works.

Beta-Naphthol — First hands quote the market steady at 25c. per lb., carload lots, prompt shipment from works.

Creosote—The English markets for creosote oil were nominally unchanged on the basis of 8½c. per gal., loose, f.o.b. point of production. Demand from America, according to reports, has been less active.

Cresylic Acid—During the past week 400 drums of cresylic acid arrived at New York from foreign ports, chiefly Rotterdam. The market was irregular, competition being quite keen. On contract it was possible to shade 70c. per gal., drums included. Prompt shipment acid was quoted at 70@80c. per gal., as to seller and quality.

H Acid — Several handlers held out for 80c. per lb., reporting a firmer market.

Naphthalene—The movement of crude naphthalene from abroad has shown no signs of abating and refiners as well as intermediate makers are in a better position to obtain supplies than a year ago. During the past week close to 4,000 bags of naphthalene arrived at New York from England and the Continent. The market for good grades of crude for shipment held at 2¼@2½c. per lb., c.i.f. basis. Manchester, England, advices quote crude at £5@£11 per ton., ex-works, according to quality. Domestic producers offered flake for shipment at 6c. per lb.

Phenol—U.S.P. material sold on spot at 25c. per lb., in drums. Several producers held out for 26c. per lb., but with competition keen prices in more than one direction were unsettled. On futures prices were wholly nominal, being subject to negotiation.

Pyridine — There were offerings of pyridine on spot at $5.25 per gal., in drums, which compares with recent business at $6 per gal. On futures it was possible to do $4.25 per gal., with the undertone easy as consumers here were not interested in far off material. Importations last week amounted to 66 drums.

Salicylates—There was a fairly active call for salicylates and prices firmed up in nearly all quarters. Several producers look for prices to advance in the near future. Japan was a good buyer of salicylate of soda.

Xylene—Offerings were plentiful and prices presented an unsettled appearance. On the pure 50c. per gal. was asked. The commercial grade, in drums, held at 34c. per gal.

Trade Notes

W. A. Robinson, of W. A. Robinson & Co., prominent factors in fish oils, mineral oils, etc., at New Bedford, Mass., has been elected director in the Southern States Oil Corp.

Official announcement is made by the Federal Trade Commission that hearings in the complaint against the Procter & Gamble Co. will be resumed in New York City on Nov. 19.

Henry W. Peabody & Co., together with Victor Blagden & Co., Ltd., of London, have been appointed sole selling agents for the sale of yellow prussiate of soda and yellow prussiate of potash manufactured by the American Cyanamid Co. at Warners, N. J.

The Frolic of the Druachem Club will be held at the Brevoort on the evening of Nov. 27. Arrangements have been made to take care of 200. Acts from various Broadway productions will furnish the amusement.

F. W. Pickard, vice-president of E. I. du Pont de Nemours & Co., sailed for Europe last week. While abroad he will visit the various agencies of the company.

George S. Mahana, vice-president of the Corn Products Refining Co., sailed for Europe last Tuesday. He will inspect the foreign plants of the company before his return.

The Federal Trade Commission has charged the Graham Soap Co. of Chicago with the use of misleading designations in brand names of soaps.

The Texas Carbon Industries, Inc., Breckenridge, Tex., has commenced operations at its new plant for the production of carbon black. The company is said to have contracted for its output for some time to come, the bulk of the material being sold to rubber-manufacturing interests at Akron, Ohio.

The American Cotton Oil Co. has disposed of its property on the Kill von Kull River, Bayonne, N. J., to the Commonwealth Realty & Investment Co., for a consideration stated at $200,000.

Thomas G. Haight was discharged last Tuesday as receiver for the British-American Chemical Corp. of New Jersey. A report from the receiver stated that the balance in his hands, $40,659.23, had been distributed among creditors.

J. A. Still, who was a leading factor in the formation of the National Sulphur Co. and was a director of that company and also of Battele & Renwick, died at his home in Brooklyn last week.

B. P. Steele, formerly with W. F. George Chemical Co. of New York, is now associated with Edward Hill's Son & Co. at Chicago.

Vegetable Oils and Fats

Steady Inquiry for Spot and Nearby Material—Consumers Show No Buying Interest In Futures

DEMAND for spot and nearby deliveries was good and this was taken as proof that the movement of finished products into consuming channels remains satisfactory. Soap makers were heavy buyers of tallow, taking round lots at unchanged prices. Coconut oil was firm on the strength in copra and sustained inquiry from consumers as well as speculative interests. There was a break in cottonseed oil, occasioned by liquidation in the option market. There was a steady demand for sesame oil for December delivery, and, according to traders, much of the oil arriving from abroad is being absorbed by cottonseed oil refiners.

Cottonseed Oil—A reaction set in on heavy liquidation on the part of Southern speculative traders. The decline in refined oil on the Produce Exchange brought out freer offerings of crude and late in the week the latter sold at 9½c. per lb., tank cars, f.o.b. Texas, which compares with 10¼c. per lb. less than a week ago. In the Valley sales went through at 9⅝c. per lb., tank cars, f.o.b. mills. Bleachable oil closed nominally at 10¾c. per lb., tank cars, f.o.b. Texas common points. The cotton situation attracted attention, but quite a number of traders thought that the reduced yield already has been discounted by prevailing high prices. Talk regarding the increase in the demand for substitute oils, principally sesame oil, had some influence upon the market. According to official figures slightly more than 40,000 bbl. of sesame oil were imported into the United States for the 9 months period ending with September 30. Lard compound held at 13¾@14c. per lb., carload basis, New York.

Linseed Oil—Spot oil steadied, but futures remained unsettled. During the past week several crushers advanced the November quotation to 90c. per gal., in bbl., carload lots, thereby placing nearby oil on a parity with spot. It was reported that only few crushers were able to take on prompt business. A fair volume of November-December business went through at prices ranging from 88@90c. per gal., cooperage basis. Futures were entirely nominal. The fact that Argentine seed was offered in the Buenos Aires option market for December shipment at $1.79 per bu. made buyers of oil cautious and it strengthened opinion that the new crop would be a large one. January-February-March-April oil actually sold at 84c. per gal., in bbl., carload basis. Late in the week 86c. was asked in most quarters, but the market was unsettled. Stocks of flaxseed at Minneapolis were placed at 656,078 bu., which compares with 500,456 bu. a week ago and 76,563 bu. a year ago. Crop news from the Argentine was favorable.

Castor Oil—There was an advance of ½c. per lb. in all grades. The No. 3, commercial grade, settled at 13½c. per lb., in bbl.

China Wood Oil—Receipts increased, but no selling pressure developed and, with primary markets firm, dealers continued to quote 21@21½c. per lb., spot and nearby delivery. On the Pacific coast 20c. was asked on tank cars, all positions.

Coconut Oil—The demand was less active, but firm prices prevailed in all quarters, reflecting smaller stocks of oil and steadiness in copra. At the close January forward shipment from the coast was offered at 8⅝c., sellers' tanks.

Crude Cottonseed Oil Lower—November Linseed Higher, but Forward Months Available at Concessions — Palm Oils Advance—Castor Oil Up ½c.—Crude Corn Easier — Sales of Crude Soya at 10.10c. Norfolk — Active Market for Tallow. Stearine Lower.

Bids at 8¼c. for bulk oil, c.i.f. New York, were turned down. Crushers advanced immediate shipment Ceylon type oil to 8¾c. per lb., sellers' tanks, f.o.b. New York. Copra, Cebu sundried, sold at 5@5¼c. per lb., c.i.f. Pacific coast. There were sellers of Manila at 5½c., c.i.f. New York.

Corn Oil—After selling at 10½c., Chicago, the market for crude was easier in sympathy with cottonseed. Late in the week November oil was offered at 10¼c. f.o.b. mills.

Olive Oil Foots—Italian prime green foots sold for shipment at 8¾c. per lb. Spanish foots offered at 8½c. per lb., round lot basis, 1924 shipment. Demand active.

Palm Oils—Good quality Lagos on spot sold at 7¾c. per lb., 150 tons changing hands. The shipment price was raised to 7⅞c. c.i.f. New York. Niger was firmer at 7½@7¾c., according to position.

Palm Kernel Oil—There were offerings at 8½c., c.i.f. New York, but no buyers.

Rapeseed Oil—Refined oil sold down to 70½c. per gal., forward delivery. Later prices advanced to 72½@73c. per gal.

Sesame Oil—One lot of 150 bbl. of refined for December delivery sold at 12½c. per lb. Futures nominal at 11⅞c. per lb., c.i.f. New York.

Fish Oils—Steady market for Newfoundland cod oil, with sales at 68c. per gal. Menhaden oil firm at 50c. per gal., tanks, f.o.b. factory.

Tallow, Etc.—Close to 2,000,000 lb. of extra special tallow sold at 8c. per lb., ex plant, the price showing no change from that named a week ago. The market for high grade tallow was firm at the close. Yellow grease held at 6⅝@6⅞c. per lb., according to grade. Oleo stearine sold at 11c. per lb., a decline of ½c.

Miscellaneous Materials

Antimony — Chinese and Japanese brands 9¼c. W.C.C. brand 9½@10c. Cookson's "C" grade, 12@12½c. Chinese needle antimony, lump, nominal, 6.50c. per lb. Standard powdered needle antimony (200 mesh), 7@8c. per lb. White antimony oxide, Chinese, guaranteed 99 per cent Sb_2O_3, 7.50@8c.

Barytes—There was an easier market in the West, white floated closing at $24@$26 per ton, f.o.b. St. Louis. Foreign material was offered more freely in New York.

Glycerine — Dynamite glycerine was offered in the Middle West at 16c. per lb., in drums, carload basis, indicating that the market was a shade easier. Bids were reduced to 15¾c. per lb. In chemically pure the undertone was barely steady, keen competition resulting in scattered business at concessions. Quotably the market for the C.P. held at 16½@17c. per lb., as to quantity and seller. Crude soap lye glycerine, basis 80 per cent, held at 10¾c. per lb., loose, f.o.b. point of shipment. Saponification was unchanged at 12¼c. per lb., loose.

Quicksilver—The market presented a steady tone, leading handlers quoting $62 per flask of 75-lb.

Naval Stores—Early in the week the market for spirits of turpentine was easy around 95@96c. per gal., but before the close an advance set in down South and operators here raised the price to 97c. per gal. Domestic trade showed improvement. In rosins the situation underwent little change. Demand was fair and prices steady, the lower grades holding at $5.80 per bbl.

Lithopone — Domestic producers reported a seasonable volume of business and with no important change in the basic materials prices were maintained at 7@7¼c. per lb., nearby positions. Foreign material for shipment was available at concessions.

White Lead—There was an advance in the price of pig lead to 6.85 per lb., New York. The uplift brought out no change in the position of lead pigments. Corroders reported a good movement of material against existing contracts, with new business also up to normal for this season of the year. Standard dry white lead, in casks, held at 9¼c. per lb.

Zinc Oxide—Producers continued to quote at 8c. per lb. for American process, lead free, and 7@7¼c. per lb. for American process, leaded grades. French process, red seal, held at 9¾c. per lb., with the green seal at 10¾c. and the white seal at 12c. per lb. Demand was quiet.

Imports at the Port of New York

November 9 to November 15

ACIDS — Cresylic — 55 dr., Hamburg, Order; 47 dr., Liverpool, Chase National Bank; 50 dr., Glasgow, Caldwell & Co.; 62 dr., Rotterdam, Lunham & Moore; 185 dr., Rotterdam, Order. **Formic**—78 carboys, Hamburg, E. Suter & Co.; 280 demijohns, Rotterdam, R. W. Greeff & Co. **Oxalic**—30 bbl., Hamburg, Roessler & Hasslacher Chem. Co.; 30 csk., Rotterdam, R. W. Greeff & Co. **Stearic**—20 cs., Rotterdam, M. W. Parsons. **Tartaric**—600 bbl. Bari, Order; 100 csk., Rotterdam, Benkert & Co.

ACETALDEHYDE — 4 cs., Hamburg, Elmer & Amend.

ALCOHOL—125 bbl. denatured, Arecibo, C. Esteva; 150 csk. butylic, Bordeaux, Commercial Solvents Corp.

ANTIMONY OXIDE—500 cs., Hankow, Sino Java Handels; 250 cs., Hankow, Hardy & Ruperty, Inc.

ANTIMONY REGULUS—750 cs., Shanghai, Wah Chang Trading Co.; 500 cs., Hankow, Sino Java Handels.; 500 cs., Hankow, Hardy & Ruperty, Inc.; 500 cs., Shanghai, Nassau Smelting & Refining Works.

AMMONIUM CARBONATE — 20 csk., Liverpool, Farmers Loan & Trust Co.; 20 csk., Liverpool, Order.

AMMONIUM CHLORIDE—20 cs., Liverpool, Wing & Evans.

ARSENIC—200 cs., Shanghai, Wah Chang Trading Co.; 133 cs., Tsingtao, Fraser & Co.; 200 csk., Hamburg, Central Union Trust Co.; 200 dr., Hamburg, Superfos Co.; 39 bbl., Antwerp, Order; 300 bbl., Tampico, American Smelting & Refining Co.; 180 bbl., Tampico, American Metal Co.

BARIUM CARBONATE—364 sk. and 121 bbl., Hamburg, H. Kastor.

BARIUM CHLORATE—29 csk., Hamburg, Goldschmidt Corp.

BARIUM CHLORIDE—52 csk., Antwerp, American Express Co.

BLEACHING POWDER—50 cs., Liverpool, Kohnstamm & Co.

BUTYL ACETATE—15 dr., Rotterdam, Lunham & Moore.

BARYTES—1 lot (quantity not specified), Bremen Ore & Chemical Corp.; 102 csk., Hamburg, Roessler & Hasslacher Chemical Co.; 200 bg., Hamburg, Cooper & Cooper; 59 bbl., Hamburg, Order; 200 bg., Hamburg, L. A. Salomon & Bros.; 41 csk., Hamburg, Brown Bros. & Co.

CALCIUM CHLORIDE—3,000 csk., Hamburg, Irving Bank-Col. Trust Co.; 70 keg, Hamburg, Jungmann & Co.

CALCIUM CYANIDE—8,138 dr., Hamburg, Guaranty Trust Co.

CASEIN—200 bg., St. Nazaire, National City Bank; 213 bg., St. Nazaire, E. B. Muns; 1,417 bg., Buenos Aires, Kalbfleisch Corp.

CHALK—154 bbl., Hamburg, Cooper & Cooper; 1,200 bg., Antwerp, Order; 104 csk. and 5,000 bg., Antwerp, Cooper & Cooper; 900 bg., Antwerp, R. E. Bridgette; 500 bg., Antwerp, Reichard-Coulston, Inc.; 2,400 bg., Antwerp, Brown Bros. & Co.; 1,500 bg., Antwerp, L. A. Salomon & Bros.; 1,000 bg., Antwerp, Order; 1,500 tons (bulk), Dunkirk, J. W. Higman Co.; 1,923 tons, Dunkirk, Taintor Trading Co.; 1,500 tons, Dunkirk, Kidder, Peabody & Co.

CHEMICALS—10 csk., Hamburg, Hensel, Bruckmann & Lorbacher; 3 pkg., Hamburg, Hardy & Ruperti; 20 csk., Bremen, Hummel & Robinson; 250 pkg., Hamburg, Jungmann & Co.; 200 bbl., Hamburg, Globe Shipping Co.; 195 csk., Hamburg, Order; 68 pkg., Rotterdam, Order; 38 bbl., Antwerp, Order; 32 cs., Hamburg, Elmer & Amend; 756 bg., Glasgow, E. M. Sergeant & Co.; 500 bg., Glasgow, Brown Bros. & Co.

COAL-TAR DISTILLATE—17 dr., Liverpool, Order; 120 dr., Liverpool, Monsanto Chemical Works; 72 dr., Liverpool, Order.

COLORS—9 pkg. aniline, Havre, Sandoz Chemical Works; 29 csk., do., Havre, Ciba Co.; 20 csk. do., Havre, Geigy Co.; 4 csk. do., Havre, Order; 4 csk., Havre, Irving Bank-Col. Trust Co.; 4 csk, Hamburg, Heemsoth, Basse & Co.; 3 csk., Havre, Walther Co.; 37 pkt., Havre, Ciba Co.; 6 csk., aniline, Havre, Sandoz Chemical Works; 7 pkg., Havre, Order; 3 csk., Liverpool, American Exchange National Bank; 5 csk., London, American Express Co.; 33 csk. aniline, Rotterdam, H. A. Metz & Co.; 2 csk., Rotterdam, Earle & Co.; 32 csk. aniline, Rotterdam, Order.

CREAM TARTAR — 30 csk. and 5 cs., Hamburg, A. J. Marcus.

CREOSOTE—7 dr., Liverpool, Order.

DIVI-DIVI—2,072 bg., Maracaibo, Selma Mercantile Corp.; 288 bg., Rio Hacha, De Lima, Correa & Cortissoz.

DYEWOOD EXTRACT—25 csk., Liverpool, W. A. Ross & Bro.

FERROCHROME—27 csk., Gothenburg, D. Heydemann & Co.; 100 cs., Bordeaux, Int'l Ores & Metal Selling Co.

FLUORSPAR — 200 bg., Hamburg, O. Haase.

FUSEL OIL—5 csk., Hamburg, Maas & Waldstein; 20 bbl., Hamburg, Order; 5 bbl., Rotterdam, Order; 79 dr., Rotterdam, Order; 12 dr., Antwerp, Order; 12 dr., Rotterdam, Honeywill Bros.

GAMBIER — 160 bg. cube, Singapore, Order; 850 cs., Asahan, Order.

GLAUBER SALT—113 bbl., Hamburg, Superfos Co.

HYDROSUPEROXIDE — 70 carboys, Hamburg, Jungmenn & Co.

IRON CHLORIDE—54 csk., Hamburg, Order.

IRON OXIDE—15 csk., Liverpool, S. Doggett, Inc.; 5 csk., Liverpool, J. A. McNulty; 48 csk., Liverpool, J. Lee Smith & Co.; 126 csk., Liverpool, C. B. Chrystal Co.; 8 csk., Liverpool, Reichard-Coulston, Inc.; 20 csk., Hull, J. Lee Smith & Co.

IRON SULPHATE — 23 csk., Bremen, Farmers Loan & Trust Co.; 139 csk., Antwerp, E. M. Sergeant & Co.; 55 bbl., Liverpool, Order.

LOGWOOD EXTRACT—126 bbl., Cape Haitian, Logwood Mfg. Co.

LOGWOOD — 642 tons, Monte Christi, W. & A. Leaman.

LITHOPONE—1,200 csk., Antwerp, Benjamin Moore & Co.; 210 csk., Antwerp, E. M. & F. Waldo.

MAGNESIUM CHLORIDE — 385 dr., Hamburg, Brown Bros. & Co.

MAGNESIUM CARBONATE — 15 cs., Newcastle, E. J. Barry.

MAGNESIUM FLUORIDE — 37 bbl., Hamburg, Order.

MENTHOL — 50 cs., Tsingtao, S. W. Bridges & Co.

MAGNESITE—6,000 bg. lump and 2,402 bg. crude, Madras, Order; 102 bg., Rotterdam, Speiden-Whitfield Co.

MANGANESE RESINATE — 53 bbl., Hamburg, Chaplain & Bibbo, Inc.

MYROBALANS—4,007 bg., Vizagapatam, Gordon, Woodruff & Co.

NAPHTHALENE — 2,962 bg., Antwerp, Order; 585 bg., Rotterdam, Pacific Chemical Co.; 380 bg., Rotterdam, Lunham & Moore.

OCHER—100 csk., Bordeaux, J. H. Furrmann.

OILS—China Wood—120 csk., Hankow, Brown Bros. & Co.; 155 bbl., Hankow, China Hide & Produce Co.; 299 bbl., Hankow, Veile, Blackwell & Buck; 305 bbl., Hankow, Balfour, Williamson & Co.; 380 csk., Hankow, G. W. S. Patterson & Co.; 230 csk., Hong Kong, Bank of the Manhattan Co.; 118 bbl., Hong Kong, Innes & Co. **Cod**—69 csk. and 3 ½-csk., Halifax, Cook & Swan, Inc.; 100 csk., St. Johns, Cook & Swan, Inc.; 200 csk., St. Johns, Franklin's Agencies; 200 csk., St. Johns, National Oil Products Co.; 100 csk., St. Johns, Order; 140 tons, St. Johns, Bowring & Co.; 167 tons, St. Johns, R. Badcock & Co.; 200 bbl., Hull, J. C. Francesconi & Co.; 200 bbl., Hull, First National Bank of Boston; 200 bbl., Hull, Order. **Olive Foots** (sulphur oil) —200 bbl., Naples, Ellis, Jackson & Co.; 900 bbl., Bari, Order; 50 bbl., Barcelona, Order. **Palm**—27 bbl., Belawan, Sinclair Oil Co.; 14 csk., Liverpool, Order; 199 csk., Rotterdam, African & Eastern Trading Co.; 57 csk., Cotonou, Sinclair Oil Co. **Rapeseed**—10 csk., Havre, Foreign Shipping Service; 3 csk., Havre, F. Marty & Co.; 250 bbl., Hull, J. C. Francesconi; 760 tons (bulk), Hull, Vacuum Oil Co.; 275 bbl., Hull, Order;

OIL SEEDS—Castor—11,541 bg., Cocanada, Ralli Bros.

PHOSPHATE—2,000 bg., Antwerp, Order.

PITCH—70 bbl., Liverpool, Order;

POTASSIUM SALTS—52 bbl. caustic, Bremen, Brown Bros. & Co.; 40 csk. salts, Hamburg, E. Suter & Co.; 130 csk. caustic, Hamburg, A. Klipstein & Co.; 2,000 dr. permanganate, Hamburg, Equitable Trust Co.; 87 bbl., Hamburg, Roessler & Hasslacher Chemical Co.; 75 dr. caustic, Hamburg, Peters, White & Co.; 86 csk. do., Hamburg, Goldschmidt Corp.; 69 csk. do., Hamburg, A. Klipstein & Co.; 16 csk. alum, Hamburg, Meteor Products Co.; 250 bg. sulphate, Bremen, Potash Importing Corp. of America; 174 bbl. caustic, Hamburg, Roessler & Hasslacher Chemical Co.; 39 csk. carbonate, Hamburg, Innis, Speiden & Co.; 53 bbl. carbonate, Hamburg, Superfos Co.; 1,670 bg. manure salts, and 15,255 bg. muriate, Antwerp Societe des Potasses D'Alsace; 108 tins perchlorate, Antwerp, Hummel, Robinson Corp.

PYRIDINE—11 dr., Hamburg, Order; 11 dr., Liverpool, A. Hurst & Co.; 6 dr., Liverpool, R. W. Greeff & Co.; 5 dr., Liverpool, U. S. Industrial Alcohol Co.; 13 dr., Rotterdam, Du Pont de Nemours Co.; 20 dr., Rotterdam Lunham & Moore.

QUEBRACHO—965 bg., Buenos Aires, Beekman, Winthrop & Co.; 523 bg., Buenos Aires, G. H. Lynen & Co.; 8,275 bg., Buenos Aires, Order; 19,724 bg., Buenos Aires, Tannin Corp.

QUICKSILVER — 200 flasks, Genoa, Order; 32 flasks, Tampico, G. Ramos.

ROCHELLE SALTS—10 csk., Hamburg, A. J. Marcus.

SAL AMMONIAC—36 bbl., Hamburg, J. Munroe & Co.; 97 bbl., Hamburg, Roessler & Hasslacher Chem. Co.; 36 bbl., Hamburg, Order; 120 csk., Liverpool, A. H. Pickering & Co.; 20 csk., Liverpool, C. De P. Field & Co.; 47 csk., Hamburg, E. Suter & Co.; 62 csk., Hamburg, Innis, Speiden & Co.;

SHELLAC—100 bg., Calcutta, W. Brandt's Sons & Co.; 250 bg., Calcutta, London & Brazilian Bank; 200 bg., Calcutta, Chase National Bank; 100 bg., Calcutta, J. W. Green & Co.; 2,454 bg., Calcutta, Order; 180 sk., Hamburg, A. Helmrath; 100 bg. garnet, Hamburg, Kasebier-Chatfield Shellac Co.; 10 chests do., Hamburg, Rogers-Pyatt Shellac Co.; 100 bg., Calcutta, Standard Bank of South Africa; 765 bg. and 213 bg. seedlac, Calcutta, First Federal Foreign Banking Corp.; 850 bg., Calcutta, Order.

SODIUM SALTS—428 dr. caustic, Hamburg, A. Klipstein & Co.; 31 bbl., Hamburg, Roessler & Hasslacher Chem. Co.; 136 bbl. silica fluoride, Copenhagen, Order; 100 dr. caustic, Liverpool, Order; 580 dr. sulphite, Hamburg, C. S. Grant & Co.; 250 csk. hydrosulphite, Rotterdam, Kuttroff, Pickhardt & Co.; 250 bbl. silica fluoride, Rotterdam, Innis, Speiden & Co.; 170 bg. silica fluoride, Rotterdam, Order; 134 csk. phosphate, Antwerp, Roessler & Hasslacher Chem. Co.; 37 csk. phosphate, Antwerp, Farmers Loan & Trust Co.; 94 bg. phosphate, Antwerp, A. Klipstein & Co.

STARCH—250 bg., Rotterdam, Chicago Starch Co.

STRONTIUM NITRATE—18 csk., Hamburg, Meteor Products Co.

TALC—800 bg., Bordeaux, Hammond & Gillespie Co.; 400 bg., Bordeaux, Moore & Munger.

TALLOW — 279 csk. inedible, Buenos Aires, National City Bank.

TARTAR—16 csk., Catania, C. B. Richard & Co.; 209 bg., Rotterdam, C. Pfizer & Co.; 79 csk., Naples, Tartar Chemical Works; 112 bg., Valencia, C. Pfizer & Co.; 229 sk., Barcelona, Harshaw, Fuller & Goodwin Co.

TURMERIC—350 bg., Shanghai, D. L. Moss & Co.

ULTRAMARINE — 16 csk., Liverpool, Fezandie & Sperrle.

VALONEA EXTRACT — 511 pkg., Smyrna, First National Bank of Boston; 7,454 sk., Gythion, Order.

WAXES—309 cs. bees, Havre, Lazard Freres; 4 bx. bees, Cienfuegos, Order; 84 bg. bees, Antwerp, Order; 50 cs. spermaceti, Glasgow, Order; 61 bg. carnauba and 32 bg. bees, Rio de Janeiro, American Trading Co.; 14 bg. bees, Rio de Janeiro, Sullivan, Kyle & Co.; 110 bg. ozokerite, Trieste, Order.

WOOL GREASE — 30 bbl., Liverpool, Bourne, Scrymser & Co.; 30 bbl., Liverpool, Order; 125 bbl., Hull, S. Greenberg; 88 bbl., Hull, Elbert & Co.; 25 bbl., Hull, Order.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 -	$0.25½
Acetic anhydride, 85%, dr.	lb.	.38 -	....
Acid, acetic, 28%, bbl.	100 lb.	3.38 -	3.63
Acetic, 56%, bbl.	100 lb.	6.75 -	7.00
Acetic, 80%, bbl.	100 lb.	9.58 -	9.83
Glacial, 99½%, bbl.	100 lb.	12.00 -	12.78
Boric, bbl.	lb.	.10 -	....
Citric, kegs	lb.	.47 -	.49½
Formic, 85%	lb.	.12 -	.14
Gallic, tech.	lb.	.45 -	.50
Hydrofluoric, 52%, carboys	lb.	.11 -	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½-	.12
22% tech., light, bbl.	lb.	.05½-	.06
Muriatic, 18° tanks	100 lb.	.90 -	1.00
Muriatic, 20°, tanks	100 lb.	1.00 -	1.10
Nitric, 36°, carboys	lb.	.04½-	.05
Nitric, 42°, carboys	lb.	.05¼-	.05½
Oleum, 20%, tanks	ton	18.50 -	19.00
Oxalic, crystals, bbl.	lb.	.11¾-	.12
Phosphoric, 50% carboys	lb.	.07½-	.08½
Pyrogallic, resublimed	lb.	1.50 -	1.60
Sulphuric, 60°, tanks	ton	9.00 -	11.00
Sulphuric, 60°, drums	ton	13.00 -	14.00
Sulphuric, 66°, tanks	ton	15.00 -	16.00
Sulphuric, 66° drums	ton	20.00 -	21.00
Tannic, U.S.P., bbl.	lb.	.65 -	.70
Tannic, tech., bbl.	lb.	.45 -	.50
Tartaric, imp., powd., bbl.	lb.	.27½-	.28½
Tartaric, domestic, bbl.	lb.	.32½-	....
Tungstic, per lb.	lb.	1.10 -	1.20
Alcohol, butyl, drums, f.o.b. works	lb.	.26 -	.28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.77 -	....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.74 -	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.47½-	...
No. 1, 190 proof, special, dr.	gal.	.41½-	...
No. 1, 188 proof, bbl	gal.	.48½-	...
No. 1, 188 proof, dr	gal.	.42½-	...
No. 5, 188 proof, bbl.	gal.	.46½-	...
No 5, 188 proof, dr.	gal	.40½-	...
Alum, ammonia, lump, bbl.	lb.	.03½-	.04
Potash, lump, bbl.	lb.	.03 -	.03¼
Chrome, lump, potash, bbl.	lb.	.05½-	.06½
Aluminum sulphate, com., bags	100 lb.	1.40 -	1.50
Iron free bags	lb.	2.40 -	2.50
Aqua ammonia, 26°, drums	lb.	.07 -	.07½
Ammonia, anhydrous, cyl.	lb.	.30 -	.30½
Ammonium carbonate, powd. tech., casks	lb.	.09 -	.09½
Ammonium nitrate, tech., casks	lb.	.09 -	.10
Amyl acetate tech., drums	gal.	4.50 -	4.75
Antimony Sulphuret, golden.	lb.	.19 -	.20
Arsenic, white, powd., bbl.	lb.	.13½-	.14
Arsenic, red, powd., kegs	lb.	.15 -	.15½
Barium carbonate, bbl.	ton	72.00 -	75.00
Barium chloride, bbl.	ton	83.00 -	90.00
Barium dioxide, 88%, drums	lb.	.17½-	.18
Barium nitrate, casks	...	.07¼-	.08
Blanc fixe, dry, bbl.	lb.	.04 -	.04¼
Bleaching powder, f.o.b. wks., drums	100 lb.	1.25 -	....
Spot N. Y. drums	100 lb.	1.75 -	....
Borax, bbl.	lb.	.05¼-	.05½
Bromine, cases	lb.	.28 -	.30
Calcium acetate, bags	100 lb.	4.00 -	4.05
Calcium arsenate, dr.	lb.	.12 -	.14
Calcium carbide, drums	lb.	.05 -	.05¼
Calcium chloride, fused, dr. wks.	ton	21.00 -	....
Gran. drums works	ton	27.00 -	....
Calcium phosphate, mono, bbl.	lb.	.06½-	.07
Camphor, cases	lb.	.85 -	.86
Carbon bisulphide, drums	lb.	.06 -	.06½
Carbon tetrachloride, drums	lb.	.09 -	.09½
Chalk, precip.—domestic, light, bbl.	lb.	.04¼-	.04½
Domestic, heavy, bbl.	lb.	.03½-	.04
Imported, light, bbl.	lb.	.04½-	.05
Chlorine, liquid, tanks, wks.	lb.	.04 -	.04¼
Contract, tanks, wks.	lb.	.03¼-	....
Cylinders, 100 lb., wks.	lb.	.05½-	.06
Cylinders, 100 lb., spot	lb.	.08½-	.09
Chloroform, tech., drums	lb.	.30 -	.32
Cobalt, oxide, bbl.	lb.	2.10 -	2.25
Copperas, bulk, f.o.b. wks.	ton	21.00 -	24.00
Copper carbonate, bbl.	lb.	.18 -	.19
Copper cyanide, drums	lb.	.47 -	.50
Coppersulphate, dom., bbl.	100 lb.	5.00 -	....
Imp bbl.	100 lb.	4.50 -	....
Cream of tartar, bbl.	lb.	.22½-	.25½
Epsom salt, dom., tech., bbl.	100 lb.	1.75 -	2.00
Epsom salt, imp., tech., bags	100 lb.	1.00 -	....
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 -	2.50
Ether, U.S.P., resale, dr.	lb.	.13 -	.15
Ethyl acetate, 85%, drums.	gal.	.92 -	.95
Ethyl acetate, 100%, dr.	gal.	$1.05 -	$1.10
Formaldehyde, 40%, bbl.	lb.	.11 -	.11½
Fullers earth—f.o.b. mines.	ton	18.00 -	20.00
Fusel oil, ref., drums	gal.	.... -	....
Fusel oil, crude, drums	gal.	4.25 -	....
Glaubers salt, wks., bags	100 lb.	1.20 -	1.40
Glaubers salt, imp., bags	100 lb.	.90 -	.95
Glycerine, c.p., drums extra	lb.	.16½-	.17
Glycerine, dynamite, drums	lb.	.16 -	.16½
Glycerine, crude 80%, loose	lb.	.10¼-	.10½
Iron oxide, red, casks	lb.	.12 -	.18
Lead:			
White, basic carbonate, dry, casks	lb.	.09¼-	.09½
White, basic sulphate, casks	lb.	.08½-	.09
White, in oil, kegs	lb.	.11½-	.11¾
Red, dry, casks	lb.	.10½-	.10¾
Red, in oil, kegs	lb.	.13 -	.14½
Lead acetate, white crys., bbl.	lb.	.14 -	.14½
Brown, broken, casks	lb.	.13 -	.13½
Lead arsenate, powd., bbl.	lb.	.18 -	.20
Lime-Hydrated, bg, wks.	ton	10.50 -	12.50
Bbl., wks	ton	18.00 -	19.00
Lime, Lump, bbl	280 lb.	3.63 -	3.65
Litharge, comm., casks	lb.	.10¼-	.10½
Lithopone, bags	lb.	.07 -	.07¼
in bbl.	lb.	.07½-	.07¾
Magnesium carb., tech., bags	lb.	.08½-	.08¾
Methanol, 95%, bbl.	gal.	.93 -	....
Methanol, 97%, bbl.	gal.	.95 -	....
Methanol, pure, tanks	gal.	.90 -	....
drums	gal.	.00 -	....
bbl	gal.	1.05 -	....
Methyl-acetone, t'ks	gal.	1.15 -	....
Nickel salt, double, bbl.	lb.	.10½-	....
Nickel salts, single, bbl.	lb.	.11½-	....
Phosgene	....	.60 -	.75
Phosphorus, red, cases	lb.	.... -	....
Phosphorus, yellow, cases	lb.	.35 -	.40
Potassium bichromate, casks	lb.	.09½-	.09¾
Potassium bromide, gran., bbl.	lb.	.19 -	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06¼-	.06¾
Potassium chlorate, powd.	lb.	.07½-	.08½
Potassium cyanide, drums	lb.	.47 -	.52
Potassium, first sorts, cask	lb.	.08½-	.08¾
Potassium hydroxide (caustic potash) drums	lb.	.06¾-	.07
Potassium iodide, cases	lb.	3.65 -	3.75
Potassium nitrate, bbl.	lb.	.07½-	.09
Potassium permanganate, drums	lb.	.17 -	.17½
Potassium prussiate, red, casks	lb.	.56 -	.58
Potassium prussiate, yellow, casks	lb.	.25 -	.26
Salammoniac, white, gran., casks, imported	lb.	.06½-	....
Salammoniac, white, gran., bbl., domestic	lb.	.07¼-	.07¾
Gray, gran., casks	lb.	.08 -	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk)	ton	22.00 -	23.00
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.25 -	....
bags, contract	100 lb.	1.38 -	....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.35 -	....
bags, contract	100 lb.	1.45 -	....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 -	....
Soda, caustic, ground and flake, contracts, dr.	100 lb.	3.50 -	3.85
Soda, caustic, solid, 76% f. a.s. N. Y.	100 lb.	3.00 -	3.10
Sodium acetate, works, bbl.	lb.	.05½-	.05¾
Sodium bicarbonate, bulk	100 lb.	1.75 -	....
330-lb. bbl.	100 lb.	2.00 -	....
Sodium bichromate, casks	lb.	.07¼-	.07½
Sodium bisulphate (niter cake)	ton	6.00 -	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½-	.04¾
Sodium chlorate, kegs	lb.	.06½-	.07
Sodium chloride	long ton	12.00 -	13.00
Sodium cyanide, cases	lb.	.19 -	.22
Sodium fluoride, bbl.	lb.	$0.08½-	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½-	.02¾
Sodium nitrite, casks	lb.	.07½-	......
Sodium peroxide, powd., cases	lb.	.28 -	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½-	.04
Sodium prussiate, yel. drums	lb.	.11¼-	.11½
Sodium salicylic, drums	lb.	.40 -	.42
Sodium silicate (40°, drums)	100 lb.	.75 -	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 -	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 -	.04
Sodium sulphite, crys., bbl.	lb.	.03½-	.03¾
Strontium nitrate, powd., bbl.	lb.	.11½-	.12
Sulphur chloride, yel drums.	lb.	.04½-	.05
Sulphur, crude	ton	18.00 -	20.00
At mine, bulk	ton	16.00 -	18.00
Sulphur, flour, bag	100 lb.	2.25 -	2.35
Sulphur, roll, bag	100 lb.	2.00 -	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 -	.08½
Tin bichloride, bbl.	lb.	.12½-	.13
Tin oxide, bbl.	lb.	.47 -	.....
Tin crystals, bbl.	lb.	.32 -	.32½
Zinc carbonate, bags	lb.	.14 -	.14½
Zinc chloride, gran, bbl.	lb.	.06½-	.06¾
Zinc cyanide, drums	lb.	.37 -	.38
Zinc oxide, , lead free, bbl.	lb.	.08 -	.08½
5% lead sulphate, bags	lb.	.07½-	......
10 to 35 % lead sulphate, bags	lb.	.07 -	......
French, red seal, bags	lb.	.09½-	......
French, green seal, bags	lb.	.10¼-	......
French, white seal, bbl	lb.	.12 -	......
Zinc sulphate, bbl.	100 lb.	2.75 -	3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 -	$0.70
Alpha-naphthol, ref., bbl.	lb.	.65 -	.80
Alpha-naphthylamine, bbl.	lb.	.35 -	36
Aniline oil, drums	lb.	.16 -	.16½
Aniline salts, bbl.	lb.	.23 -	.23½
Anthracene, 80%, drums	lb.	.75 -	.80
Anthracene, 80%, imp., drums, duty paid	lb.	.65 -	.70
Anthraquinone, 25%, paste, drums	lb.	.80 -	.85
Benzaldehyde U.S.P., carboys	lb.	1.50 -	.....
f.f.c. drums	lb.	1.60 -	.....
tech, drums	lb.	75	.....
Benzene, pure, water-white, tanks, works	gal.	.23 -	....
Benzene, 90%, tanks, works	gal.	.21 -	....
Benzidine base, bbl.	lb.	.80 -	.85
Benzidine sulphate, bbl.	lb.	.75 -	....
Benzoic acid, U.S.P., kegs	lb.	.80 -	80
Benzoate of soda, U.S.P., bbl.	lb.	.65 -	.70
Benzyl chloride, 95-97%, ref., carboys	lb.	.40 -	....
Benzyl chloride, tech., drums	lb.	.25 -	....
Beta-naphthol, tech., bbl.	lb.	.25 -	.26
Beta-naphthylamine, tech	lb.	.75 -	.80
Cresol, U.S.P., drums	lb.	.25 -	29
Ortho-cresol, drums	lb.	.28 -	.32
Cresylic acid, 97%, works drums	gal.	.75 -	.85
95-97%, drums, works	gal.	.70 -	75
Dichlorbenzene, drums	lb.	.06 -	.08
Diethylaniline, drums	lb.	.50 -	.60
Dimethylaniline, drums	lb.	.40 -	.41
Dinitrobenzene, bbl.	lb.	.18 -	.20
Dinitrochlorbenzene, bbl.	lb.	.21 -	.22
Dinitronaphthalen, bbl.	lb.	.30 -	.32
Dinitrophenol, bbl.	lb.	.35 -	.40
Dinitrotoluen, bbl.	lb.	.20 -	.22
Dip oil, 25%, drums	gal.	.25 -	.30
Diphenylamine, bbl.	lb.	.50 -	.52
H-acid, bbl.	lb.	.75 -	.80
Meta-phenylenediamine, bbl.	lb.	1.00 -	1.05
Michlers ketone, bbl.	lb.	3.00 -	3.50
Monochlorbenzene, drums	lb.	.08 -	.10
Monoethylaniline, drums	lb.	.95 -	1.10
Naphthalene, flake, bbl.	lb.	.06 -	.06½
Naphthalene, balls, bbl.	lb.	.06½-	.07
Naphthionate of soda, bbl.	lb.	.60 -	.65
Naphthionic acid, crude, bbl.	lb.	.55 -	.60
Nitrobenzene, drums	lb.	.09½-	.10½
Nitro-naphthalene, bbl.	lb.	.30 -	.35
Nitro-toluene, drums	lb.	.13½-	.14½
N-W acid, bbl.	lb.	1.15 -	1.20
Ortho-amidophenol, kegs	lb.	2.30 -	2.35
Ortho-dichlorbenzene, drums	lb.	.15 -	17
Ortho-nitrophenol, bbl.	lb.	1.20 -	1.30
Ortho-nitrotoluene, drums	lb.	.10 -	.12
Ortho-toluidine, bbl.	lb.	.17 -	.18
Para-amidophenol, base, kegs	lb.	1.30 -	....
Para-amidophenol, HCl, kegs	lb.	1.55 -	....
Para-dichlorbenzene, bbl.	lb.	.17 -	20
Paranitroaniline, bbl.	lb.	.74 -	.75
Para-nitrotoluene, bbl.	lb.	.60 -	.65
Para-phenylenediamine, bbl.	lb.	1.45 -	1.50
Para-toluidine, bbl	lb.	.90 -	.95
Phthalic anhydride, bbl.	lb.	.30 -	.34
Phenol, U.S.P., dr.	lb.	.25 -	.26
Picric acid, bbl.	lb.	.20 -	.22
Pyridine, dom., drums	gal.	nominal	
Pyridine, imp., drums	gal.	5.75 -	6.00
Resorcinol, tech., kegs	lb.	1.40 -	1.50

Resorcinol, pure, kegs	lb.	$2.15 –	....
R-salt, bbl	lb.	.55 –	.60
Salicylic acid, tech., bbl	lb.	.32 –	....
Salicylic acid, U.S.P., bbl	lb.	.35 –	....
Solvent naphtha, water-white, tanks	gal.	.23 –	....
Crude, tanks	gal.	.20 –	....
Sulphanilic acid, crude, bbl	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Tolidine, bbl	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars, works	gal.	.24 –	....
Toluene, drums, works	gal.	.29 –	....
Xylidine drums	lb.	.50 –	....
Xylene, pure, drums	gal.	.50 –	.55
Xylene, com., drums	gal.	.34 –	....
Xylene, com., tanks	gal.	.29 –	....

Naval Stores

Rosin B-D, bbl	280 lb.	$5.80 –	......
Rosin E-I, bbl	280 lb.	5.80 –	......
Rosin K-N, bbl	280 lb.	5.85 –	$6.10
Rosin W.G.-W.W., bbl	280 lb.	6.65 –	7.00
Wood rosin bbl	280 lb.	5.90 –	6.00
Turpentine, spirits of, bbl	gal.	.97 –	......
Wood, steam dist., bbl	gal.	.85 –	......
Wood, dest. dist., bbl	gal.	.70 –	......
Pine tar pitch, bbl	200 lb.	6.50 –	......
Tar, kiln burned, bbl	500 lb.	11.00 –	......
Retort tar, bbl	500 lb.	11.00 –	......
Rosin oil, first run, bbl	gal.	.45 –	......
Rosin oil, second run, bbl	gal.	.47 –	......
Rosin oil, third run, bbl	gal.	.50 –	......
Pine oil, steam dist	gal.	.65 –	......
Pine oil, pure, dest. dist	gal.	.60 –	......
Pine tar oil, ref	gal.	.48 –	......
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla	gal.	.32 –	.32½
Pine tar oil, double ref., bbl	gal.	.... –	.75
Pine tar, ref., thin, bbl	gal.	.... –	.25
Pinewood creosote, ref., bbl	gal.	.... –	.52

Animal Oils and Fats

Degras, bbl	lb.	$0.04 –	$0.04½
Grease yellow, bbl	lb.	.06½ –	.06¾
Lard oil, Extra No. 1, bbl	gal.	.86 –	.88
Neatsfootoil, 20 deg. bbl	gal.	1.30 –	......
No. 1, bbl	gal.	.94 –	.96
Oleo Stearine		.11 –	....
Oleo oil, No. 1, bbl	lb.	.15 –	.15½
Red oil, distilled, d.p. bbl	lb.	.08½ –	.09½
Saponified, bbl	lb.	.08½ –	.09½
Tallow, extra, loose	lb.	.08 –	......
Tallow oil, acidless, bbl	gal.	.86½ –	.87

Vegetable Oils

Castor oil, No. 3, bbl	lb.	$0.13½ –	......
Castor oil, No. 1, bbl	lb.	.14 –	......
Chinawood oil, bbl	lb.	.21 –	.21½
Coconut oil, Ceylon, bbl	lb.	.09½ –	......
Ceylon, tanks, N.Y	lb.	.08½ –	......
Coconut oil, Cochin, bbl	lb.	.10 –	......
Corn oil, crude, bbl	lb.	.11½ –	.12
Crude, tanks, (f.o.b. mill)	lb.	.10½ –	......
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½ –	.09¾
Summer yellow, bbl	lb.	.13 –	.13½
Winter yellow, bbl	lb.	.13½ –	.13¾
Linseed oil, raw, car lots, bbl.	gal.	.90 –	......
Raw, tank cars (dom.)	gal.	.84 –	......
Boiled, cars, bbl. (dom.)	gal.	.92 –	......
Olive oil, denatured, bbl	gal.	1.10 –	1.12
Sulphur, (foots) bbl	lb.	.08½ –	.08¾
Palm, Lagos, casks	lb.	.07½ –	......
Niger casks	lb.	.07½ –	......
Palm kernel, bbl	lb.	.08½ –	.08¾
Peanut oil, crude, tanks (mill)	lb.	.12 –	....
Peanut oil, refined, bbl	lb.	.14 –	....
Perilla, bbl	lb.	.14½ –	.14½
Rapeseed oil, refined, bbl	gal.	.73 –	.75
Rapeseed oil, blown, bbl	gal.	.82 –	......
Sesame, bbl	lb.	.12½ –	.12¾
Soya bean (Manchurian), bbl.	lb.	.11 –	......
Tank, f.o.b. Pacific coast	lb.	.09½ –	......
Tank, (f.o.b. N.Y.)	lb.	.10½ –	......

Fish Oils

Cod, Newfoundland, bbl	gal.	$0.68 –	......
Menhaden, light pressed, bbl.	gal.	.64 –	......
White bleached, bbl	gal.	.66 –	......
Blown, bbl	gal.	.70 –	......
Crude, tanks (f.o.b. factory)	gal.	.50 –	......
Whale No. 1 crude, tanks, coast	lb.	.... –	......
Winter, natural, bbl	gal.	.75 –	.76
Winter, bleached, bbl	gal.	.78 –	.79

Oil Cake and Meal

Coconut cake, bags	ton	$34.00 –	....
Cottonseed meal, f.o.b. mills	ton	42.00 –	....
Linseed cake, bags	ton	40.00 –	....
Linseed meal, bags	ton	44.00 –	....

Dye & Tanning Materials

Albumen, blood, bbl	lb.	$0.45 –	$0.50
Albumen, egg, tech, kegs	lb.	.95 –	.97
Cochneal, bags	lb.	.32 –	.34
Cutch, Borneo, bales	lb.	.04 –	.04½
Cutch, Rangoon, bales	lb.	.15 –	.16
Dextrine, corn, bags	100 lb.	3.89 –	4.10
Dextrine gum, bags	100 lb.	4.17 –	4.44
Divi-divi, bags	ton	38.00 –	39.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Gambier com. cs	lb.	.08½ –	.09
Logwood, sticks	ton	25.00 –	26.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	80.00 –	85.00
Sumac, ground, bags	ton	$75.00 –	$80.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags	100 lb.	3.32 –	3.42
Tapioca flour, bags	lb.	.07 –	.07½

Extracts

Archil, conc., bbl	lb.	$0.16½ –	$0.20
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl	lb.	.04 –	.05
Fustic, crystals, bbl	lb.	.20 –	.22
Fustic, liquid, 42°, bbl	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.09 –	.09½
Hematine crys., bbl	lb.	.14 –	.18
Hemlock, 25% tannin, bbl	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl	lb.	.09½ –	.10½
Logwood, crys., bbl	lb.	.14 –	.15
Logwood, liq., 51°, bbl	lb.	.07½ –	.08
Quebracho, solid, 65% tannin, bbl	lb.	.04½ –	.05
Sumac, dom., 51°, bbl	lb.	.06½ –	.07½

Dry Colors

Blacks-Carbongas, bags, f.o.b. works, spot	lb.	$0.14 –	$0.18
Lampblack, bbl	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues-Bronze, bbl	lb.	.45 –	.50
Prussian, bbl	lb.	.45 –	.50
Ultramarine, bbl	lb.	.08 –	.35
Browns, Sienna, Ital., bbl	lb.	.06 –	.14
Sienna, Domestic, bbl	lb.	.03½ –	.04
Umber, Turkey, bbl	lb.	.04 –	.04½
Greens-Chrome, C.P. Light, bbl	lb.	.28 –	.30
Chrome, commercial, bbl	lb.	.12 –	.12½
Paris, bulk	lb.	.27 –	.28
Reds, Carmine No. 40, tins	lb.	4.50 –	4.70
Oxide red, casks	lb.	.10 –	.14
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl	lb.	1.15 –	1.20
Yellow, Chrome, C.P. bbls	lb.	.18 –	....
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl	lb.	$0.25 –	$0.26
Beeswax, crude, Afr. bg	lb.	.22 –	....
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candelilla, bags	lb.	.23½ –	.24
Carnauba, No. 1, bags	lb.	.36 –	.38
No. 2, North Country, bags	lb.	.23½ –	.24
No. 3, North Country, bags	lb.	.16½ –	.17
Japan, cases	lb.	.16 –	.16½
Montan, crude, bags	lb.	.05 –	...
Paraffine, crude, match, 105-110 m.p., bbl	lb.	.04½ –	.04¾
Crude, scale 124-126 m.p. bags	lb.	.03 –	....
Ref., 118-120 m.p., bags	lb.	.03½ –	....
Ref., 125 m.p., bags	lb.	.03½ –	....
Ref., 128-130 m.p., bags	lb.	.04 –	....
Ref., 133-135 m.p., bags	lb.	.04½ –	.05
Ref., 135-137 m.p., bags	lb.	.05½ –	....
Stearic acid, sgle pressed, bags	lb.	.12½ –	.12¾
Double pressed, bags	lb.	.13 –	.13½
Triple pressed, bags	lb.	.14½ –	.14¾

Fertilizers

Ammonium sulphate, bulk f.o.b. works	100 lb.	$3.20 –	$3.25
F.a.s. double bags	100 lb.	3.40 –	3.50
Blood, dried, bulk	unit	4.40 –	4.60
Bone, raw, 3 and 50, ground	ton	28.00 –	30.00
Fish scrap, dom., dried, wks	unit	4.20 –	......
Nitrate of soda, bags	100 lb.	2.45 –	2.52½
Tankage, high grade, f.o.b. Chicago	unit	3.25 –	3.35
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	4.00 –	4.50
Tennessee, 78-80%	ton	7.75 –	8.00
Potassium muriate, 80%, bags	ton	34.55 –	......
Potassium sulphate, bags basis 90%	ton	43.67 –	......
Double manure salt	ton	25.72 –	......
Kainit	ton	7.22 –	......

Crude Rubber

Para—Upriver fine	lb.	$0.24 –	......
Upriver coarse	lb.	.19½ –	......
Upriver caucho ball	lb.	.20 –	......
Plantation—First latex crepe	lb.	.28 –	......
Ribbed smoked sheets	lb.	.27½ –	......
Brown crepe, thin, clean	lb.	.25½ –	......
Amber crepe No. 1	lb.	.26½ –	......

Gums

Copal, Congo, amber, bags	lb.	$0.10 –	$0.15
East Indian, bold, bags	lb.	.21 –	.22
Manila, pale, bags	lb.	.19 –	.20
Pontinak, No. 1 bags	lb.	.19 –	.20
Damar, Batavia, cases	lb.	.24½ –	.25
Singapore, No. 1, cases	lb.	.32 –	.33
Singapore, No. 2, cases	lb.	.21½ –	.22
Kauri, No. 1, cases	lb	.64 –	.66
Ordinary chips, cases	lb.	.21 –	.23
Manjak, Barbados, bags	lb.	.09 –	.14

Shellac

Shellac, orange fine, bags	lb.	$0.64 –	$0.65
Orange superfine, bags	lb.	.66 –	.67
A. C. garnet, bags	lb.	.65 –	....
Bleached, bonedry	lb.	.72 –	.73
Bleached, fresh	lb.	.60 –	....
T. N., bags	lb.	.59 –	.60

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh. ton	$350.00 –	$450.00
Asbestos, shingle, f.o.b., Quebec	sh. ton	$50.00 –	$60.00
Asbestos, cement, f.o.b., Quebec	sh. ton	17.00 –	20.00
Barytes, grd., white, f.o.b. mills, bbl	net ton	15.00 –	18.00
Barytes, grd., off-color, f.o.b. Balt	net ton	12.00 –	14.00
Barytes, floated, f.o.b. St. Louis, bbl	net ton	24.00 –	26.00
Barytes, crude f.o.b. mines, bulk	net ton	8.00 –	10.00
Casein, bbl., tech	lb.	.11½ –	.14½
China clay (kaolin) crude, f.o.b. Ga	net ton	6.00 –	8.00
Washed, f.o.b. Ga	net ton	8.00 –	9.00
Powd., f.o.b. Ga	net ton	14.00 –	20.00
Crude f.o.b. Va	net ton	6.00 –	8.00
Ground, f.o.b. Va	net ton	13.00 –	19.00
Imp., lump, bulk	net ton	15.00 –	20.00
Imp., powd	net ton	45.00 –	50.00
Feldspar, No. 1 pottery	long ton	7.00 –	8.00
No. 2 pottery	long ton	6.00 –	....
No. 1 soap	long ton	8.50 –	....
No. 1 Canadian, f.o.b. mill, powd	long ton	20.00 –	....
Graphite, Ceylon, lump, first quality, bbl	lb.	.06 –	.06½
Ceylon, chip, bbl	lb.	.04½ –	.07
High grade amorphous crude	ton	15.00 –	30.00
Gum arabic, amber, sorts, bags	lb.	.13½ –	.14½
Gum tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.40 –	1.45
Kieselguhr, f.o.b. Cal	ton	40.00 –	42.00
F.o.b. N. Y	ton	50.00 –	55.00
Magnesite, crude, f.o.b. Cal	ton	14.00 –	15.00
Pumice stone, imp., casks	lb.	.03 –	.05½
Dom., lump, bbl	lb.	.05 –	.05½
Dom., ground, bbl	lb.	.05½ –	.06
Silica, glass sand, f.o.b. Ind	ton	2.00 –	2.50
Silica, sand blast, f.o.b. Ind	ton	2.50	5.00
Silica, amorphous, 200-mesh, f.o.b. Ill	ton	20.00 –	....
Silica, glass sand, f.o.b. Ill	ton	1.50 –	3.00
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	6.50 –	8.50
Talc, 200 mesh, f.o.b. Ga., bags	ton	7.00 –	9.00
Talc, 350 mesh, f.o.b. New York, grade A bags	ton	22.00 –	....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.35 –	2.60
Corning	bbl.	1.25 –	......
Cabell	bbl.	1.20 –	......
Somerset	bbl.	1.15 –	......
Illinois	bbl.	1.22 –	......
Indiana	bbl.	1.23 –	......
Kansas and Oklahoma, 28 deg.	bbl.	.50 –	......
California, 35 deg. and up	bbl.	.76 –	......

Gasoline, Etc.

Motor gasoline, steel bbls	gal.	$0.16½ –	......
Naphtha, V. M. & P. deod, steel bbls	gal	.15½ –	......
Kerosene, ref. tank wagon	gal.	.14 –	......
Bulk, W.W. delivered, N.Y.	gal.	.06 –	......
Lubricating oils:			
Cylinder, Penn., dark	gal.	.22½ –	......
Bloomless, 30@31 grav	gal.	.17½ –	......
Paraffin, pale	gal.	.16 –	.17
Spindle, 200, pale	gal.	.20 –	.20½
Petrolatum, amber, bbls	lb.	.03½ –	.04
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–145
Chrome brick, f.o.b. Eastern shipping points	ton	50–52
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks	1,000	42–45
2nd. quality, 9-in. shapes, f.o.b. wks	1,000	35–38
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	50–53
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	50–53
F.o.b. Mt. Union, Pa	1,000	42–45
Silicon carbide refract. brick, 9-in.	1,000	950.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y	ton	$200.00 –	$225.00
Ferrochromium, per lb. of Cr, 1-2% C	lb.	.28 –	.30
4-6% C	lb.	.12 –	...
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	110.00 –	....
Spiegeleisen, 19-21% Mn	gr. ton	42.00 –	45.00
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 –	2.50
Ferrosilicon, 10-12%	gr. ton	43.00 –	50.00
50%	gr. ton	82.50 –	85.00

Ferrotungsten, 70–80%, per lb. of W........	lb.	$0.88 @ $0.90
Ferro-uranium, 35-50% of U. per lb. of U........	lb.	4.50 – ....
Ferrovanadium, 30-40%, per lb. of V..........	lb.	3.50 – 4.50

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points................	ton	$5.50 – $8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3.	ton	22.00 – 23.00
C.i.f. Atlantic seaboard...	ton	19.25 – 21.25
Coke, fdry., f.o.b. ovens....	ton	5.00 – 5.50
Coke, furnace, f.o.b. ovens...	ton	3.75 – 4.00
Fluorspar, gravel, f.o.b. mines' Illinois........	ton	23.50 –........
Ilmenite, 52% TiO_2........	lb.	.00¾– .01
Manganese ore, 50% Mn c.i.f. Atlantic seaport..	unit	.40 – .42
Manganese ore, chemical (MnO_2)...............	ton	75.00 – 80.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.....	lb.	.75 –........
Monazite, per unit of ThO_2, c.i.f., Atl. seaport.....	lb.	.06 – .08
Pyrites, Span., fines, c.i.f Atl. seaport...........	unit	.11½– .12
Pyrites, Span., furnace size c.i.f. Atl. seaport.......	unit	.11½– .12
Pyrites, dom. fines, f.o.b. mines, Ga.............	unit	.12 –........
Rutile, 95% TiO_2..........	lb.	.10 –........
Tungsten, scheelite, 60% WO_3 and over.........	unit	9.50 – 10.00
Tungsten, wolframite, 60% WO_3...............	unit	9.00 –........
Uranium ore (carnotite) per lb. of U_3O_8...........	lb.	3.50 – 3.75
Uranium oxide, 96% per lb. U_3O_8................	lb.	2.25 – 2.50
Vanadium pentoxide, 99%..	lb.	12.00 – 14.00
Vanadium ore, per lb. V_2O_5..	lb.	.75 – 1.00
Zircon....................	ton	80.00 –........

Non-Ferrous Metals

		Cents per Lb.
Copper, electrolytic		13⅛–13¼
Aluminum, 98 to 99%................		26–28
Antimony, wholesale, Chinese and Japanese........		9½
Nickel, 99%................		27–32
Monel metal, shot and blocks.........		32.00
Monel metal, ingots..............		38.00
Monel metal, sheet bars............		45.00
Tin, 5-ton lots, Straits............		42 62½
Lead, New York, spot............		6.85
Lead, E. St. Louis, spot............		6 70
Zinc, spot, New York............		6.75
Zinc, spot, E. St. Louis............		6.40
Silver (commercial)..........	oz.	$0.63⅜
Cadmium...............	lb.	.75@ .80
Bismuth (500 lb. lots)........	lb.	2.55
Cobalt..................	lb.	3.00-3 25
Magnesium, ingots, 99%.....	lb.	1.25–.....
Platinum..............	oz.	120.00
Iridium	oz.	275.00@300.00
Palladium..............	oz.	80.00
Mercury..................75	lb.	62.00
Tungsten....	lb.	.97–1.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled............	19.25
Copper bottoms...............	29.75
Copper rods..............	19 75
High brass wire...............	18 00
High brass rods...............	15 75
Low brass wire...............	20.25
Low brass rods...............	20.50
Brazed brass tubing...............	23.50
Brazed bronze tubing...............	27 00
Seamless copper tubing............	25.50
Seamless high brass tubing..........	24.00

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible.........	9.00@ 9.50
Copper, heavy and wire..........	10.25@10.50
Copper, light and bottoms.........	8.50@ 8.75
Lead, heavy...............	5.50@ 5.62½
Lead, tea...............	3.50@ 3 75
Brass, heavy...............	6.00@ 6.25
Brass, light...............	5.25@ 5.50
No. 1 yellow brass turnings.........	5.75@ 6.00
Zinc scrap...............	3.75@ 4.00

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes..............	$3.54	$3.54
Soft steel bars..............	3.54	3.54
Soft steel bar shapes..............	3.54	3.54
Soft steel bands..............	4.39	4.39
Plates, ½ to 1 in. thick....	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

SELMA—The Alabama Concrete Products Co. has tentative plans under advisement for the installation of additional equipment at its plant, including an overhead cableway system.

BESSEMER—The Bessemer Galvanizing Works, Jefferson County Bank Bldg., Birmingham, Ala., has commenced foundations for a new local plant, to be 1-story, 100x120 ft., estimated to cost $30,000, with steel-galvanizing and other operating equipment. William M. Clark is general manager.

Arkansas

BAUXITE—The recently announced expansion plans of the American Bauxite Co. at its local properties will not be carried out, according to a statement of the company, and operations will be curtailed at this location.

California

LONG BEACH—Plans are being perfected for the early purchase of equipment for the proposed municipal gas plant, estimated to cost in excess of $750,000. H. W. Burkhart has been engaged as engineer for the project. C. H. Windham is city manager.

SAN JOSE—The Guadalupe Portland Cement Co., recently organized with a capital of $3,000,000, has acquired a tract of about 260 acres of land in the Almaden mines section, San Jose, heretofore held by Maurice Pope, San Francisco, as a site for a new cement mill. The plant will consist of a number of units with power house, machine shop and auxiliary buildings, estimated to cost close to $1,000,000. The new company is headed by Robert Dunlay, Frederick G. Cartwright and Leo J. Pope. Boswell F. King, Humboldt Bank Bldg., San Francisco, is registered agent for the organization.

Connecticut

WALLINGFORD—M. Backes Sons, Inc., manufacturer of percussion caps, powder products, etc., has awarded a general contract to the Loucks & Clark Co., Wallingford, for the erection of a 1-story and basement addition on Ward St., to be 30x130 ft., equipped for general production.

Florida

KELSEY CITY—The American Fiber Co., lately organized, has arranged with the East Coast Finance Corp. for the erection of a local building, to be equipped for a new plant and occupied under lease by the first-noted company. Foundation work will soon be commenced. A list of equipment to be installed will be prepared at an early date. William H. Power, West Palm Beach, Fla., is secretary and treasurer.

MIAMI—The Odorless Plant Food Co., recently organized, is planning for the construction of a local plant for the manufacture of fertilizer products from phosphate rock. Norman W. Graves is president.

Illinois

CHICAGO—Fire, Nov. 2, destroyed a portion of the plant of the William J. Stange Chemical Co., 2549 West Madison St., manufacturer of flavoring extracts, etc., with loss estimated at $22,000. It is planned to rebuild.

CHICAGO—The Lykglas Auto Paint Co. has leased a new 1-story building at 4543-47 West Lake St., totaling about 10,000 sq.ft. of floor space, for the establishment of a new local plant for the manufacture of paint and varnish. It is expected to equip and occupy the structure at an early date.

CHICAGO—The Standard Sanitary Mfg. Co., Bessemer Bldg., Pittsburgh, Pa., manufacturer of enameled iron sanitary ware, vitreous china products, etc., will take bids at once through A. S. Alschuler, 28 East Jackson Blvd., Chicago, architect, for the erection of a new local factory branch at 3726 Iron St., to be 5-story and basement, 115x203 ft. The company is now operating a Chicago plant at 14-30 North Peoria St., and it is purposed to remove this works to the new location.

CHICAGO—Merger plans have been arranged by the Northwestern Terra Cotta Co., 2525 Clybourn Ave., Chicago, and the Denver Terra Cotta Co., Denver, Colo. The combined organization purposes to perfect plans for expansion at an early date. The first-noted company is capitalized at $3,500,000, and the Denver company at $200,000.

Iowa

NEWTON—The Maytag Co., North 4th Ave., manufacturer of mechanical specialties, has tentative plans under advisement for the construction of a new addition, to be equipped as an aluminum foundry. It is estimated to cost in excess of $200,000, with machinery. L. B. Maytag is president.

DUBUQUE—Lawrence Whalen and John Heim, Dubuque, are perfecting plans for the organization of a new company to construct and operate a plant in the vicinity of Eagle Point, for the manufacture of tile products. It is estimated to cost $30,000.

DAVENPORT—The Northwestern Davenport Cement Block Co. has plans nearing completion for the construction of a new 2-story plant on West Locust St., near the Fair Grounds, 72x75 ft., estimated to cost about $25,000. It will be equipped for the manufacture of cement blocks and kindred products. A. H. Ebeling, Mahl Bldg., is architect. Heiman Meier is president.

Kentucky

LOUISVILLE—The Standard Sanitary Mfg. Co., Bessemer Bldg., Pittsburgh, Pa., manufacturer of enameled iron sanitary ware, etc., is perfecting plans for further expansion at its local plant, in addition to a new structure, for which a general contract recently was awarded. It is purposed to expend about $1,000,000 for new buildings and equipment, on site near the present plant at Shipp, Davis and 6th Sts.

LOUISVILLE—The United States Foil Co., 30th St. and Grand Ave., has commenced the construction of a new solvent extraction plant at 3000 Hale Ave., estimated to cost $17,000.

Louisiana

NEW ORLEANS—The Louisiana Oxygen Co. has work nearing completion on a new plant unit, adjoining its present acetylene works at Washington Ave. and Rendon St., estimated to cost approximately $200,000, with equipment, and expects to occupy the structure at an early date. It will be given over to the production of industrial oxygen both by the electrolytic and air-reduced processes.

Maryland

BALTIMORE—The Lykglas Corp. has recently acquired the plant of the Drop Forge Mfg. Co., in the Carroll Park section, and plans to use the property for a new plant for the manufacture of glass specialties.

CUMBERLAND—The Maryland Glass Co. is completing the erection of a new plant unit, 30x150 ft., at its works, to be given over to the manufacture of quality table glass and decorated art glassware. It is expected to add to the present working force, now totaling close to 300 persons. Within the past few years the company has expended about $250,000 for plant expansion and has doubled the capacity.

Michigan

DETROIT—The Detroit Concrete Receptacle Co., 4225-27 Michigan Ave., manufacturer of cement and concrete products, has engaged architects Stratton, Snyder & Bauer, 1103 Union Trust Bldg., architects, to prepare plans for the erection of a new 1-story plant in the Woodward Heights Blvd., district, to cost approximately $250,000, including machinery.

New Jersey

VULCANITE—The Vulcanite Portland Cement Co. has commenced the installation of additional equipment at its local mills, for increased output and reduction in operating costs. To provide for the expansion, a bond issue of $600,000, is being sold, a portion of the fund to be used for this purpose. Headquarters are in the Land Title Bldg., Philadelphia, Pa.

MILLVILLE—The Tavern Sand Co., said to be affiliated with the Illinois Glass Co., Alton, Ill., has commenced the construction of a new local plant for the development of silica sand properties, with reduction and washing works for commercial production. It is estimated to cost about $100,000, including equipment.

NEW BRUNSWICK—The American Fused Silica Corp., recently organized, has tentative plans for the establishment of a plant in this vicinity for the manufacture of fused silica products. The company will control and operate under the patents of Armin Forst, Fords, N. J., for this character of production, as well as glassware specialties. It is headed by Paul W. Ewing and Whitfield Farrington, 101 Albany St., New Brunswick.

New York

ALBANY—The Albany Perforated Wrapping Paper Co., operating as the A. P. W. Paper Co., has acquired a large tract of property in the vicinity of Sheet Harbor, near Halifax, N. S., heretofore held by the Sheet Harbor Lumber Co., and plans for the construction of a new local pulp mill to cost approximately $250,000, including equipment. It is purposed to develop an initial output of about 36,000 cords of pulpwood per month, giving employment to more than 200 operatives. The majority of equipment will be electrically operated.

BUFFALO—The Pratt & Letchworth Co., 189 Tonawanda St., manufacturer of iron and steel castings, has filed plans and will commence the immediate erection of a 1-story addition to its foundry, 70x210 ft., estimated to cost $75,000.

North Carolina

WILMINGTON—The Wilmington Oil & Fertilizer Co., recently organized with a capital of $200,000, has acquired the local plant of the American Cotton Oil Co., including about 15 acres of land. The new owner plans to remodel and improve the structures, and will occupy for the manufacture of oils and fertilizer products. Oscar Pearsall is one of the heads of the company.

WILSON—Edgerton Concrete Products Co., 202 Planters Bank Bldg., has plans under way for the erection of a new local plant for the manufacture of concrete tile and kindred products. The initial works will be equipped for an output of about 5,000 tiles per day, with the machinery for the most part electrically operated. The works are estimated to cost $35,000.

Ohio

CLEVELAND—The Acorn Refining Co., 8001 Franklin Ave., manufacturer of paints, etc., will commence the erection of two new buildings at its plant, comprising a 4-story structure, 40x85 ft., and 3-story building, 28x55 ft., estimated to cost approximately $50,000. The M. B. Parker Construction Co., 2000 Euclid Ave., is the general contractor.

Oklahoma

TULSA—The Choctaw Portland Cement Co., Hartshorne, Okla., is reported to be planning for the establishment of a new plant in the vicinity of Tulsa. It is proposed to remove the present mill to the new location. The company is arranging for additional finances for general expansion.

Pennsylvania

MILTON—The United Oxygen Mfg. Co. has commenced the erection of a new plant at Lincoln and 5th Sts., to be equipped for the manufacture of industrial oxygen products.

TARENTUM—T. N. Gummert, Tarentum, is perfecting plans for the organization of a company to construct and operate a local glass-manufacturing plant. A site will be selected at an early date. The works are estimated to cost close to $900,000, including equipment.

ALLENTOWN — The Allentown-Bethlehem Gas Co., operating artificial gas properties at Allentown, Bethlehem and vicinity, is arranging a fund of $600,000, the entire proceeds to be used for extensions and betterments, including the installation of additional equipment.

NEW CASTLE—The Johnson Bronze Co. has awarded a contract to the Truscon Steel Co., Youngstown, O., for the construction of a new addition to be equipped for the manufacture of bronze bushings and kindred products under a special process. It will give employment to about seventy-five operatives.

Tennessee

GORDONSBURG—The Non-Acid Fertilizer Co., recently organized with a capital of $400,000, has acquired a tract of about 500 acres of phosphate property in this section, and plans for extensive development. It is also purposed to build a local plant for the manufacture of fertilizer products. The entire project will involve about $100,000. John W. Fry is president, and J. C. Lowman, secretary.

MEMPHIS—The Commercial Chemical Co. of Tennessee, manufacturer of chemical insecticides for agricultural and other service, has plans for general expansion, including plant additions. The calcium arsenate factory will be enlarged and equipment installed to double, approximately, the present output; new arsenic acid and steel container plants, now in course of erection, will be rushed to completion and equipment installed. Stock for $450,000 is being sold, the proceeds to be used for the work.

Texas

FORT WORTH—The Pierce Oil Corp., 25 Broad St., New York, has preliminary plans under advisement for extensions and improvements in its oil refineries at Fort Worth and Texas City, Tex., including the construction of additional units and the installation of equipment. It is purposed to provide a fund of about $4,000 000 for the work. Clay A. Pierce is president.

MARATHON—The Continental Rubber Co. has taken over the local plant of the Texas Guayule Rubber Co., closed for some time past, and plans to remodel for a new works. Rubber will be manufactured from the wild guayule shrub under a special process. It is expected to commence operations at an early date.

Virginia

WINCHESTER—The Shenandoah Boxboard Co., recently organized at Coshocton, O., has purchased the local mill of the Old Dominion Paper Co., and will operate at this location. Extensive improvements will be made, including the installation of additional equipment. Nathan H. Carpenter is president.

New Companies

CRAWFORD CHEMICAL CO., 4054 West 26th St., Chicago, Ill.; chemicals and chemical byproducts; $10,000. Incorporators: Nathan and Israel Karl, and Martin Share.

I. D. L. PRODUCTS CORP., New York, chemicals and chemical byproducts; $100,000. Incorporators: T. Layton and L. A. Schoen. Representative: J. J. Lazaroe, 25 West 43rd St., New York.

SAWBROOK STEEL CASTINGS CO., Cincinnati, O.; steel and other metal castings; $300,000. Incorporators: E. S. and C. E. Sawtelle, Leroy Brooks, Jr., and Lewis N. Gatch, all of Cincinnati.

PHILIPPINE PRODUCTS CO., INC., 62 Tonnele Ave., Jersey City, N. J.; mineral oils and kindred products; $25,000. Incorporators: Edwin M. Simpson, B. Steinberg and Edmund Dewan.

YARG PRODUCING & REFINING CORP., Wilmington, Del.; refined petroleum products; $2,500,000. Representative: Delaware Registration Trust Co., 900 Market St., Wilmington.

RIDDOCK RUBBER CORP., Malden, Mass.; rubber products; $250,000. Charles M. Riddock is president; and C. Clifford Pierce, Rochester, Mass., treasurer.

WEST END ALCOHOL DISTRIBUTING CORP., Trenton, N. J.; industrial alcohol products; $50,000. Incorporators: Joseph Lichtenberg and Giuseppe Rossi, 33 Market St., Trenton. The last noted is representative.

FRAUNFELTER CHINA CO., Portland, Me.; chinaware and other pottery; 150,000 shares of stock, no par value. M. F. Foster, South Portland, is president; and M. G. O'Neil, Portland, treasurer.

PETROLEUM PRODUCERS, INC., Woodland, Calif.; petroleum and byproducts; $1,000,000. Incorporators: James P. Sweeney, Henry F. Boyen and R. G. Lauer, all of San Francisco.

FORT NEAL CEMENT PRODUCTS CO., Tavernnerville, W. Va.; cement products, etc.; $25,000. Incorporators: L. H. and G. C. Stevens, and Homer R. Hill, Parkersburg, W. Va.

NEWPORT MFG. CO., Wilmington, Del.; coal-tar products; $500,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington.

KEYSTONE FOLDSPAR & CHEMICAL CO., 140 South Dearborn St., Chicago, Ill.; chemical products, commercial feldspar, etc.; $10,000. Incorporators: John Schreiber, Harold R. Eyrich and F. B. Hinrichs.

LOTH PRODUCTS CORP., New York; celluloid and other composition products; $50,000. Incorporators: G. F. Maguire and J. G. Daniels. Representative: Henry Woog, 45 Cedar St., New York.

PEERLESS CHEMICAL CO., Greensboro, N. C.; organized; chemicals and chemical byproducts. H. S. Richardson and William Y. Prayer, both of Greensboro, head the company.

QUEEN CITY PETROLEUM PRODUCTS CO., Cincinnati, O.; refined oil products; $200,000. Incorporators: Louis Levenson and John Stillpass, both of Cincinnati.

MCCRYSTAL-GREENE CO., INC., Paterson, N. J.; paper products; $50,000. Incorporators: Frank H. Greene, Martin De Luccia and Joseph McCrystal, 74 First Ave., Paterson. The last noted is representative.

VINELAND SCIENTIFIC GLASS CO., Vineland, N. J.; glass products; $50,000. Incorporators: S. Webster Hurd, Edgar B. Chatterlin and William Mixner, Sr., Vineland. The last noted is representative.

DUNN CHEMICAL PRODUCTS CORP., Wilmington, Del.; $1,000,000; polishes, chemical specialties, etc. Incorporators: Harold G. Dunn, Howard Joseph and Louis H. Green. Representative: Howard A. Joseph, Wilmington.

BAY RIDGE GLASS WORKS, INC., Brooklyn, N. Y.; glass products; $10,000. Incorporators: M. Blackburn and H. L. Loshen. Representative: A. P. Loshen, 481 Fulton St., Brooklyn.

CRESCENT SILICA CO., 343 So. Dearborn St., Chicago, Ill.; to operate silica mining and reduction plants; $400,000. Incorporators: E. Dolmage and Carl M. Gottfried.

Industrial Notes

An arrangement has been effected between the WELLMAN-SEAVER-MORGAN CO. of Cleveland and Akron, Ohio, and the NEWPORT NEWS SHIPBUILDING & DRY DOCK CO. of Newport News, Va., whereby the latter company has taken over the future hydraulic turbine business of the Wellman-Seaver-Morgan Co., including the patterns, drawings, data, patents, patent applications, developed and undeveloped inventions and complete records. All these have been transferred to the Newport News Shipbuilding & Dry Dock Co. The sales offices of the Wellman-Seaver-Morgan Co. in New York, San Francisco and Birmingham, Ala., will continue to function as heretofore and will represent the Newport News Shipbuilding & Dry Dock Co. in hydraulic turbine work. The Wellman-Seaver-Morgan Co. will complete its present hydraulic contracts, carry out the guarantees and obligations thereof without reference to the Newport News Shipbuilding & Dry Dock Co. Future contracts will be taken by the Newport Co.

REGES, PRICE & REYNOLDS announce the formation of a partnership for the practice of patent law and the solicitation of patents, trademarks and copyrights, with offices in the Studio Bldg., 589-593 Main St., East Orange, N. J.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

CALIUM CARBIDE. Antofagasta, Chile. Exclusive agency.—8083.

CHEMICAL PRODUCTS, Santo Domingo, Dominican Republic. Agency.—8102.

CHEMICALS for paper manufacture, including caustic soda, chlorinated lime, potassium peroxide, and saltpeter. Vienna, Austria. Agency.—8103.

MATCHES, SAFETY, Oran, Algeria. Exclusive agency.—8089.

OILS, ESSENTIAL. London, England. Agency.—8086.

ROSIN, PINE. Vienna, Austria. Agency—8103.

TOILET ARTICLES. Singapore, Straits Settlements. Agency.—8125.

OIL, COTTONSEED. Antofogasta, Chile. Exclusive agency.—8083.

SOAPS. Calcutta, India. Agency.—8107.

WINDOW GLASS. Montevideo, Uruguay. Purchase and agency.—8121.